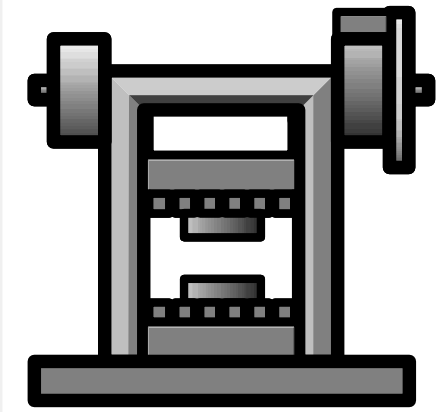
Allen-Bradley

PLS/DM Software for SLC Processors

User Manual

for PLS/DM software
(Cat. No. 6556-SPAKS)
for PLS software
(Cat. No. 6556-SPLS)
for DM software
(Cat. No. 6556-SDM)



Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is critical for successful application and understanding of the product.

PanelBuilder, PanelView and SLC are trademarks of Allen-Bradley Company, Inc.

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About This Preface

Read this preface to familiarize yourself with the rest of the manual. This preface covers the following topics:

- who should use this manual
- intended audience
- purpose of this manual
- related documentation
- Allen–Bradley support

Who Should Use this Manual?

Use this manual if you are responsible for designing, installing, programming, or troubleshooting control systems that use Allen–Bradley small logic controllers.

Intended Audience

You must have a basic understanding of SLC 500™ programmable controllers and related products, and the ladder logic instructions required to control your application. Specifically, for using:

- Advance Programming Software (APS)
  – create, edit, save, and download your ladder logic
- PanelBuilder Software
  – basics of PanelBuilder including downloading a file
- ApplicationBuilder Software (required for Clutch/Brake system)
  – compile subroutines

If not, consider contacting your local Allen–Bradley representative for information on available training courses before using this product.

Purpose of this Manual

This manual is a *reference guide* for setting up, programming, and using a hardware/software control system.. It describes the procedures that you use to:.

- determine system requirements
- set up system hardware
- install the software
- customize the system to suit your application
- use the screen displays
- test system operation

Related Documentation

The following documents contain additional information concerning Allen–Bradley SLC™ products. To obtain a copy, contact your local Allen–Bradley office or distributor.

For	Read This Document	Number
An overview of the SLC 500 family of products	SLC 500 System Overview	1747–2.30
A description on how to install and use your *Modular* SLC 500 programmable controller	Installation & Operation Manual for Modular Programmable Controllers	1747–6.2
A procedural manual for technical personnel who use APS to develop control applications	Allen–Bradley Advanced Programming Software (APS) User Manual	1747–6.4
A reference manual that contains status file data, instruction set, and troubleshooting information about APS	Allen–Bradley Advanced Programming Software (APS) Reference Manual	1747–6.11
An introduction to APS for first–time users, containing basic concepts, focusing on simple tasks and exercises, and allowing the reader to begin programming in the shortest time possible	Getting Started Guide for APS	1747–6.3
A training and quick reference guide to APS	SLC 500 Software Programmer's Quick Reference Guide available on PASSPORT at a list price of $50.	ABT–1747–TSG001
A procedural and reference manual for technical personnel who convert APS files to ASCII and conversely ASCII to APS files	APS Import/Export User Manual	1747–6.7
In–depth information on grounding and wiring Allen–Bradley programmable controllers	Allen–Bradley Programmable Controller Grounding and Wiring Guidelines	1770–4.1
A description of differences between solid–state programmable controller products and hard–wired electromechanical devices	Application Considerations for Solid–State Controls	SGI–1.1
An article on wire sizes and types for grounding electrical equipment	National Electrical Code	National Fire Protection Assoc of Boston, MA.
A complete listing of current Allen–Bradley documentation, with ordering instructions for CD–ROM and foreign-language versions.	Allen–Bradley Publication Index	SD499
A glossary of industrial automation terms and abbreviations	Allen–Bradley Industrial Automation Glossary	AG–7.1
A good introduction to get you started using PanelBuilder 550	Getting Started with PanelBuilder & PanelView 550	2711-804

Allen–Bradley Support

Allen–Bradley offers support services worldwide, with over 75 Sales/Support Offices, 512 authorized Distributors and 260 authorized Systems Integrators located throughout the United States alone, plus Allen–Bradley representatives in every major country in the world.

Local Product Support

Contact your local Allen–Bradley representative for:

- sales and order support
- product technical training
- warranty support
- support service agreements

Technical Product Assistance

If you need to contact Allen–Bradley for technical assistance, please review the information in the *Troubleshooting* chapter first. Then call your local Allen–Bradley representative.

Your Questions or Comments on this Manual

If you find a problem with this manual, please notify us of it on the enclosed Publication Problem Report.

If you have any suggestions for how this manual could be made more useful to you, please contact us at the address below:

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Automation Group
Technical Communication Dept. 602V – T122
P.O. Box 2086
Milwaukee, WI 53201–2086

Notes:

Chapter 1

Introducing PLS/DM Software

What Is PLS/DM Software?

PLS/DM software is a group of engineered press-control products for Allen-Bradley SLC processors. This software controls the operation of:

- programmable limit switch (PLS) for crankshaft synchronization
- die monitoring (DM) to protect your press dies and machinery

We have packaged PLS/DM software in three versions to maximum SLC memory capacity (words) available for the additional custom programming of your application. All three versions contain:

- counters for monitoring system or job duration
- spare setpoints for controlling custom functions
- part-file management to store and retrieve job setups
- interface to Clutch/Brake Software (cat. no. 6556-SCB)

The three versions are:

Version	Cat. No.	Description	Words
PLS/DM	6556-SPAKS	Programmable Limit Switch and Die Monitoring	12,681
DM	6556-SDM	Die Monitoring (PLS not included)	12,037
PLS	6556-SPLS	Programmable Limit Switch (DM not included)	8,626

We provide this software in the form of ladder logic, PanelView™ application files, and Software Application Modules (SAM™ s).

All three versions are designed as stand-alone software or for use with Allen-Bradley Clutch/Brake Software (cat. no. 6556-SCB).

Applying This Manual to PLS/DM Applications

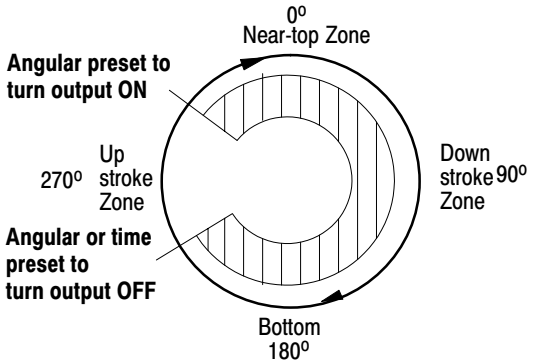
We have written this manual to cover all three versions of the software. If your system does *not* use PLS, DM, counters, and/or spare setpoints, you may skip those chapters or sections of chapters pertaining to them.

What Is a Programmable Limit Switch (PLS)?

The Allen-Bradley Programmable Limit Switch is ladder logic for an SLC™-based control system that times or sequences outputs according to precise and repeatable positions of a crankshaft. Crankshaft positions are monitored by a resolver. You can use PLS to integrate auxiliary press machinery such as lifters, grippers blow-off valves, and inter-press automation into your stamping press control system.

How a PLS Channel Works

You preset the rotational position (preset angle) at which you want the PLS output to turn ON. You select how you want the PLS output to turn OFF: by preset angle or preset time.



Then, you can program your application-specific output response, such as using the PLS output bit as a trigger to:

- initiate part movement between presses in a transfer line
- look for correct part movement with a die monitor track function
- initiate die automation devices such as grippers and lifters

What Is Die Monitoring (DM)?

Allen-Bradley Die/Automation Monitoring is ladder logic for an SLC processor and PanelView terminal designed to monitor a variety of conditions synchronized with the rotation of a stamping press crankshaft. Crankshaft positions are monitored by a resolver. You can use this product to detect the absence, mis-alignment, or unwanted presence of material moving through an automated stamping process. The software and associated hardware:

- monitor a variety of logical inputs to detect deviant conditions
- set a fault bit when it detects a deviant condition

When used with clutch/brake software (cat. no. 6556-SCB), you select whether the fault bit initiates a warning, stop-on-top, or a stop-now condition.

How a DM Channel Works

You select one of several operational modes for a DM input, such as:

- cyclic
- in-position
- track
- transfer
- analog
- static

As long as the logic detects expected conditions, no action is taken. When the logic detects a deviant condition, it sets a fault bit.

For example, in cyclic mode an input switch is expected to close within a preset zone of rotation that we call a window.

Cyclic Mode Transition Diagram	Expected Transition Occurs Within Window	Input is NOT ALLOWED When Sensor:	Which Results in a Fault SIGNAL Sent After:
	Sensor turns ON then OFF within window a-b (Pulse-type signal)	1. stays ON beyond the window	window goes OFF
		2. turns ON outside the window	sensor turns ON
		3. remains OFF for the cycle	next window goes ON

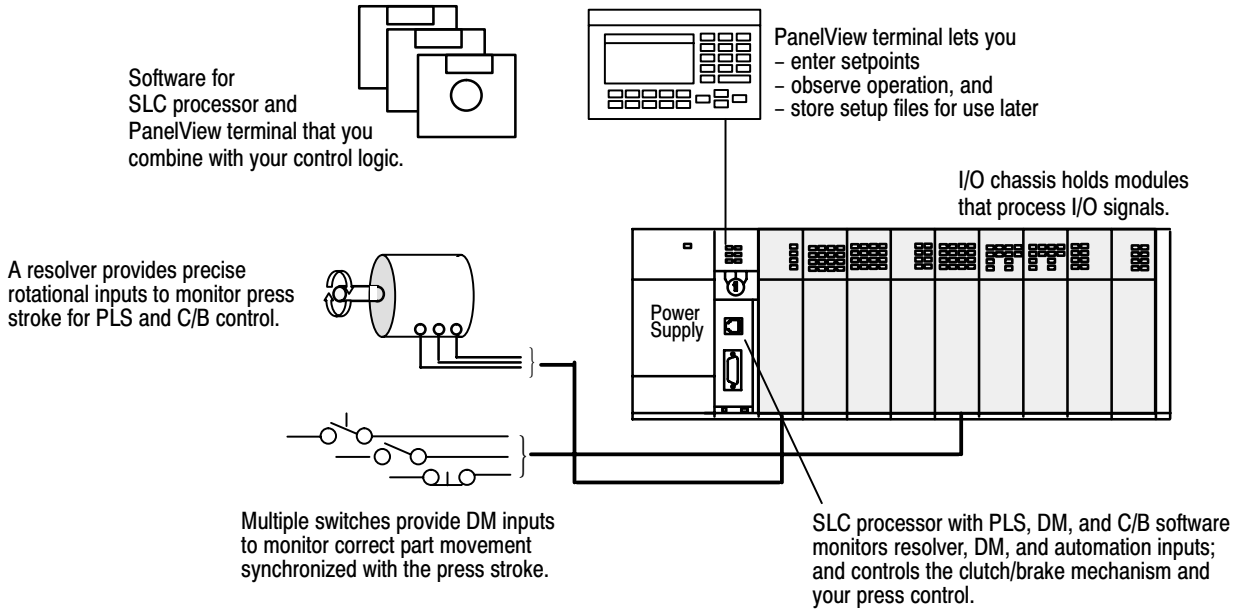
You can use a DM input to monitor an individual station such as for in-position mode, or use them in a sequence of transfer locations to monitor the progression of parts such as for transfer mode. The software provides up to 16 DM selectable input channels.

What is an SLC-based Control System?

The Allen-Bradley SLC-based control system typically consists of:

- one or more SLC processors
- I/O chassis with input and output modules
- PanelView Interface Terminal
- control software

Our control system for die monitor and programmable limit switches (cat. no. 6556-SPAKS), when combined with clutch/brake control of a stamping press (cat. no. 6556-SCB), typically contains:


Software for SLC processor and PanelView terminal that you combine with your control logic.
PanelView terminal lets you
– enter setpoints
– observe operation, and
– store setup files for use later
I/O chassis holds modules that process I/O signals.
A resolver provides precise rotational inputs to monitor press stroke for PLS and C/B control.
Power Supply
Multiple switches provide DM inputs to monitor correct part movement synchronized with the press stroke.
SLC processor with PLS, DM, and C/B software monitors resolver, DM, and automation inputs; and controls the clutch/brake mechanism and your press control.

Quick Start

This chapter can help you to get started using PLS/DM Software (cat. no. 6556-SPAKS). We assume that you have an understanding of SLC 500 products, electronic press control, and the ladder logic instructions required to control your application.

Because this chapter is a start-up guide for experienced users, it *does not* contain detailed explanations about the procedures. It does, however, refer to other chapters in this book where you can get more information. It provides a good overview for less experienced users.

If you feel that the information we present is not sufficient for you to complete a step, *always read the referenced chapters* and other recommended documentation before attempting to do the step.

This chapter:

- tells you what tools and equipment you need
- presents procedures for setting up and testing the system

Required Tools and Equipment

Have the following tools and equipment ready:

- medium blade screwdriver for connecting wires
- programming equipment
  (All programming examples shown in this manual demonstrate the use of Allen–Bradley's Advanced Programming Software (APS) for personal computers.)
- SLC processor, I/O chassis, I/O modules, resolver and resolver input module, power supply, PanelView 550 or 900 Terminal
- input switches and output devices

Procedures

1.	**Check the contents of shipping box.**	**Reference**
Unpack the shipping box making sure that the contents include in addition to this User Manual: • Software Diskette (cat. no. 6556-SPAKS) • Software License Sticker (to affix to your SLC processor) If the contents are incomplete, call your local Allen–Bradley representative for assistance.		
2.	**Familiarize yourself with PLS and DM operation, and with these procedures for setting up and using the system.**	**Chapters 1 & 2**
3.	**If using DM, determine your DM requirements.**	**Chapter 3**
Determine the modes and quantity of DM input channels, and locations and types of input switches. We provide worksheet A for your convenience. Use this information to determine types and quantity of input modules.		*Fill out Worksheet A*
4.	**If using PLS, determine your PLS requirements.**	**Chapter 4**
Determine the quantity of PLS output channels, and how they synchronize with your application. We provide worksheet B for your convenience. Use this information to determine types and quantity of output modules.		*Fill out Worksheet B*
5.	**Set up your system hardware.**	**Chapter 5**
With information on Worksheets A and B, determine: • slot locations of input and output modules • list of hardware inputs for each input module • list of hardware outputs for each output module We provide worksheets C-F for your convenience. Use this information to determine and list: • hardware addresses for mapping inputs into the data table (Worksheets C and E) • hardware addresses for mapping outputs from the data table (Worksheets D and F)		*Use Worksheets A & B* *to fill out Worksheets C-F*
6.	**Install your PLS/DM software.**	**Chapter 6**
7.	**Understand the purpose of your ladder logic and how we subdivided program files for faster system operation.**	**Chapter 7**
8.	**Program DM channel inputs and outputs, and other system inputs.**	**Chapter 8**
With information on Worksheets C and E, write ladder logic to: • map DM channel inputs into the data table • map resolver and analog inputs into the data table • map other system inputs into the data table • program DM outputs		*Use Worksheets C & E and Appendix A*

9.	**Program PLS channel inputs and outputs.**	**Chapter 9**

With information on Worksheets D and F, write ladder logic to: • map resolver inputs into the data table (if not already done in chapter 8) • program PLS outputs	*Use Worksheets D & F and Appendix A*

10.	**Program your counters.**	**Chapter 10**

For each of the two counters, write ladder logic to: • map counter inputs into the data table • program counter done bits	*Appendix A*

11.	**Set up the password and compensate for press speed.**	**Chapter 11**

Use your programming terminal to enter program constants directly into the data table for: • master password • speed-control constants A, B, and C in the algorithm $Ax^2 + Bx + C$	*Appendix A*

12.	**Customize your PanelView Screen Lists.**	**Chapter 12**

Use your programming terminal to change listed names displayed on PanelView screens from default to those that suit your application for: • part files 1-20 • channels 1-16 • spare setpoints 1-10	

13.	**Use PanelView screens to operate your system.**	**Chapters 13-15**

Use screens to: • create part files for future use • edit/monitor part files for an active job • set up counters • enter spare setpoints	

14.	**Test DM and PLS channels.**	**Chapter 16**

Use screens to test: • DM and PLS channels • resolver inputs • transfer-mode channels • track-mode DM/PLS channels	

Notes:

Determining Your DM Requirements

Objectives

This chapter helps you select the input mode and desired output condition for each DM channel so you can determine how you will apply the number of DM channels as required for your application. We start by describing the operation of DM input modes so you can select them as needed.

Operation of DM Input Modes

The purpose of DM channels is to verify that predictable conditions in your press operation take place. When the software detects a fault condition, it sets a selectable output condition. You select the type of input mode for each channel from the following:

- cyclic
- single-part
- in-position
- track
- transfer
- static
- analog

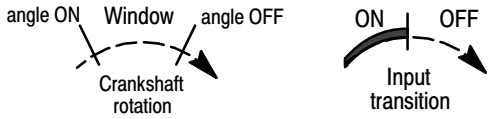
Use the following table to help you select the types of channel input modes required for your application.

When Input Signals Are:	We Call This Input Mode:	Used, For Example To:
Synchronized with crankshaft rotation, and detected within a zone or rotation (window)	Cyclic, Single-part, or In position	detect parts in position, or ejected
Within a preset timed interval started with a PLS output	Track	verify that a programmed PLS action took place
Synchronized with crankshaft rotation as parts are moved through multiple transfer locations	Transfer	verify the progression of the part from one transfer location to the next
Independent of press stroke	Static	detect the end of stock
Based on measurement with an analog sensor	Analog	measure stripper position or counter-balance pressure

A Comment on Cyclic, Single-part, and In-position Modes

Input signals for these modes are synchronized with the rotation of the crankshaft and must be detected within a zone of crankshaft rotation. We call this zone of crankshaft rotation a window. For example, a part-detect signal could be expected within a window of 80-110º to indicate that a part was inside a die before it was hit by a stroke.

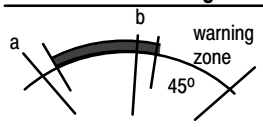
When the software detects input signals that are different from those described here, the software generates a fault signal. We graphically define these (window) inputs as follows:



Cyclic (CYC) Use this mode to verify that a pulse from the sensor (OFF-ON-OFF) occurred within the window once each stroke. For example, use it to detect that a part moved past a monitor.

Transition Diagram	For These Expected Transitions	Input is NOT ALLOWED When Sensor:	Which Results in a Fault Signal Sent After:
	Sensor turns ON then OFF within window	1. stays ON beyond window	window goes OFF
		2. turns ON outside window	sensor turns ON
		3. remains OFF for the cycle	next window goes ON

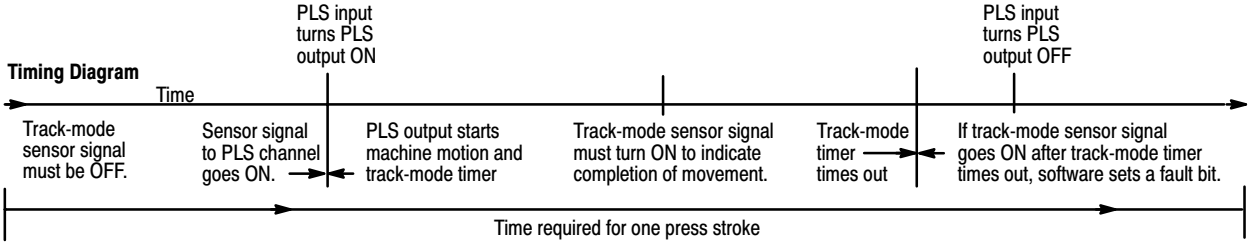
Single-part (SGP) Use this mode to verify that the sensor signal turned ON within the window and OFF within the window or the 45º warning zone each stroke. If it turns OFF late within the warning zone, the channel output is a warning. Use it to detect if a part is ejected or inserted at the correct moment in the press stroke.

Transition Diagram	For These Expected Transitions	Input is NOT ALLOWED When Sensor:	Which Results in a Fault Signal Sent After:
	Sensor turns ON within window, then OFF within window or warning zone.	1. stays ON after warning zone	window goes OFF
		2. turns ON outside window	sensor turns ON
		3. remains OFF for the cycle	next window goes ON

In-position (POS) Use this mode to verify that the sensor signal remained ON within the entire window once each stroke. The signal must cycle OFF outside the window. Use it to detect if ejector and other automation parts are retracted to home position.

Transition Diagram	For These Expected Transitions	Input is NOT ALLOWED When the Sensor Signal:	Which Results in a Fault signal Sent After:
	Sensor turns ON before, and OFF after window	1. turns OFF before window goes OFF	sensor turns OFF
		2. does not turn OFF outside window	next window goes ON
		3. remains OFF for the cycle	next window goes OFF

Track Mode (TRK) Use track mode with a PLS output to verify that an action took place. The PLS output starts the track-mode timer and the desired action at the same time. The track-mode input signal must be detected within the preset time interval of the track-mode timer and remain ON until the PLS output turns OFF. Otherwise, the software is designed to indicate a fault. Track mode (input) and PLS (output) use the same channel.


PLS input turns PLS output ON
PLS input turns PLS output OFF
Timing Diagram
Time
Track-mode sensor signal must be OFF.
Sensor signal to PLS channel goes ON.
PLS output starts machine motion and track-mode timer
Track-mode sensor signal must turn ON to indicate completion of movement.
Track-mode timer times out
If track-mode sensor signal goes ON after track-mode timer times out, software sets a fault bit.
Time required for one press stroke

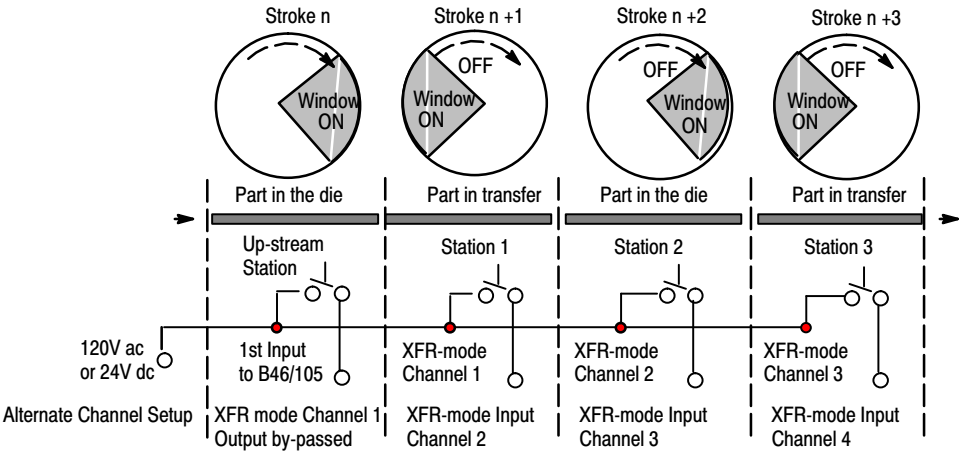
Transfer Mode (XFR) Use transfer mode to monitor the transfer of a part in a transfer press, from one transfer location to the next for each stroke of the press. Typically, each transfer location has a single-part-detect sensor. The logic of transfer mode is similar to that of a first-in-first-out (FIFO) shift register. It monitors die locations in sequence, a pair at a time. You assign consecutive channels to consecutive die locations in the sequence.

Configure the first input in a transfer-mode sequence (upstream input) with an input switch programmed to either one of:

- B46/105 (XFR-mode 1st-input bit)
- up-stream transfer-mode channel with a by-passed output

Program each channel to set a stop command when it detects a fault.

In the following 4-station example, the software looks for signals from part-detect switches to be in correct state when the window is ON. It monitors the up-stream switch, then die locations in pairs.



Static Mode (STC) Use this mode to detect that an event occurred independent of the press stroke. When a static-mode input turns Off, the programmed output is turned On. For example, use it to detect end of stock.

Analog (ALG) Use this mode to verify that a signal from an analog sensor remained within minimum and maximum limits during the programmed window. The software declares a fault signal when it detects the analog signal outside either limit. For example, use it to monitor the thickness of ribbon material moving continuously.

Screen displays, covered in another chapter, show how you select any of the previously described channel input modes.

Output Responses for DM Channels

When the software detects a channel fault, it displays the channel number and type of fault on a PanelView screen. The software also sets a fault bit that you select from the following:

- warning (you program the response)
- stop on top (for use with Allen-Bradley C/B software)
- stop now (for use with Allen-Bradley C/B software)
- output by-passed, used for XFR-mode channel entry station or when the channel is not used

When a stop command stops the press, you may program additional machine responses, such as controlling part movement between presses.

When you select warning, you can program the activation of a sound device, visual display, or some other means of conveying a warning.

Screen displays, covered in chapter 13, show how you select the desired output response.

Counting Your DM Input Channels

Determine the number of DM input channels required for your application so you can select the type and quantity of input modules to process these signals. We suggest that you use Worksheet A (next page) to do this.

Worksheet A for DM Input Channels

Use this worksheet to determine the number of DM input channels. We repeat the input and output codes for your convenience.

Instructions:

Type of Channel	Code	Type of Channel	Code	Output Response	Code
Cyclic	CYC	Track	TRK	Warning	WRN
Single-part	SGP	Transfer	XFR	Stop on Top	ST
In-position	POS	Static	STC	Stop Now	SN
		Analog	ALG		

1. For each job, write down these items in the space provided:

- Purpose of the DM input channel
- Type of input switch or analog device
- Location of input switch or device
- Type of input channel (by code)
- Output response (by code)

2. Count the number of digital (on/off) and analog channels. All channels are digital (on/off) except for analog channels.

Job # Job Name

Purpose of DM Channel	Type of Switch / Device	Location of Switch / Device	Chnl Type@	Output@

@ Enter the code for your choice of input channel and output response (from worksheet instructions).

Total DM digital channels _____ (up to 16) Total DM analog channels _____ (up to 16)

Notes:

Determining Your PLS Requirements

Objectives

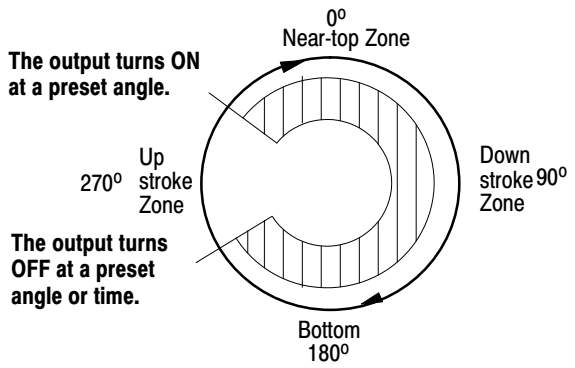
This chapter describes the operation of the programmable limit switch so you can determine the number of PLS channels required for your application. We start by describing the operation of PLS output modes so you can select them as needed.

Operation of the Programmable Limit Switch (PLS)

Allen-Bradley Programmable Limit Switch software is designed to turn outputs ON and OFF at precise crankshaft positions synchronized with crankshaft rotation monitored with a resolver. You can preset up to 16 ON/OFF settings at angles from 0-359º. You can also turn the output OFF with a timer.

A PLS output turns ON and OFF according to how you program it with a PanelView data-entry screen. For example:

Turn ON a PLS Output with a:	Turn OFF a PLS Output with a:
crankshaft ON angle that you preset	crankshaft OFF angle that you preset, or
	PLS timer that you preset

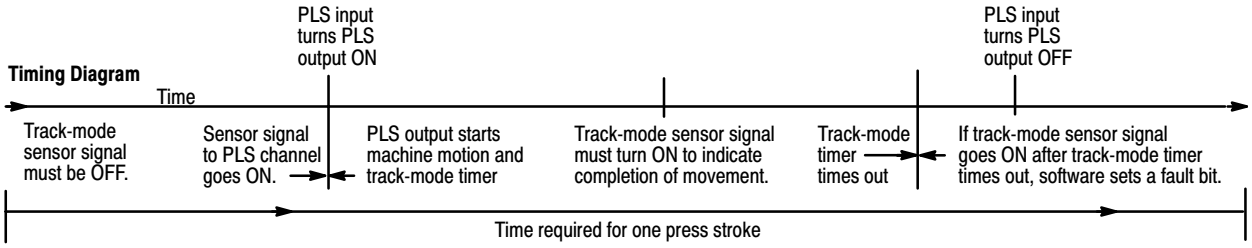


As a result, you can use PLS outputs to effectively control auxiliary press machinery such as lifters, grippers blow-off valves, and inter-press automation by programming your application-specific output responses. You write ladder logic to initiate some action when the PLS output turns On and/or Off.

Screen displays, covered in chapter 14, show how you enter the time and/or angles to control PLS operation.

Operation of the PLS Output With a DM Track-mode Input

The purpose of the PLS output channel when combined with a DM input channel configured for track mode is to verify correct operation of a programmed action. For example, you could use track mode to verify that robot arms moved a part from one location to another and returned to home position within the alloted time. We repeat the track mode diagram from chapter 3.


PLS input turns PLS output ON
PLS input turns PLS output OFF
Timing Diagram
Time
Track-mode sensor signal must be OFF.
Sensor signal to PLS channel goes ON.
PLS output starts machine motion and track-mode timer
Track-mode sensor signal must turn ON to indicate completion of movement.
Track-mode timer times out
If track-mode sensor signal goes ON after track-mode timer times out, software sets a fault bit.
Time required for one press stroke

Counting Your PLS Channels

Determine the number of PLS output channels required for your application so you can select the type and quantity or output modules to process their signals. We suggest that you use Worksheet B (next page) to do this.

Worksheet B for PLS Output Channels

Use this worksheet to determine the purpose and number of PLS channels.

Instructions:

1. For each job, write down these items in the space provided:

- Name of the PLS channel
- What the output logic will achieve
- Machine location of programmed motion
- Whether PLS will use a track-mode input (Yes or No)

2. Count the number of PLS channels required.

Job # Job Name

Name of PLS Channel	What PLS Output Logic Will Achieve	Machine Location of Programmed Motion	TRK Mode? Y / N

Total PLS channels _____ (up to 16)

Notes:

Setting Up System Hardware

Objectives

This chapter helps you determine system hardware requirements. Hardware requirements depend on how you are using PLS and DM:

- as a stand-alone control system
- with Allen-Bradley Clutch/Brake control system (cat. no. 6556-SCBK) (Available for PLS/DM are 4 output points, and up to 3 empty slots)
- with other logic

We help you:

- select I/O modules
- compute power requirements for selecting the power supply
- select the size of your I/O chassis
- assign slot locations to I/O modules
- list I/O functions on pre-addressed worksheets

We suggest that you select your I/O modules first, because your selection helps determine the size of the I/O chassis, power required for I/O modules, and I/O addressing.

Selecting I/O Modules

Your selection of I/O modules to process the input and output signals of your control system depends on:

- total number of digital inputs
- total number of analog inputs
- voltage or current specifications of your input signals
- total number of digital outputs
- total number of analog outputs
- voltage or current specifications of your output signals

Important: Tally your total system I/O requirements. Refer to:

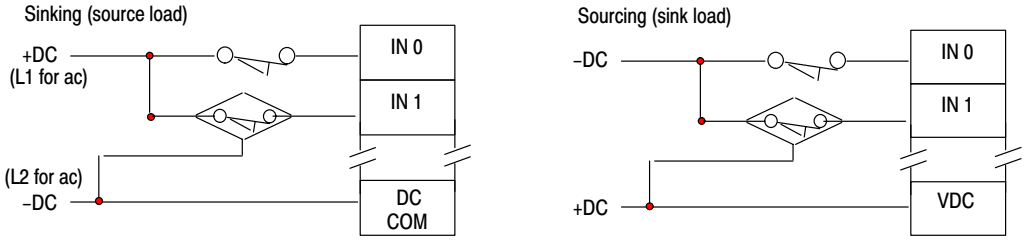
- Worksheet A for DM inputs
- Worksheet B for PLS outputs
- Your count of I/O requirements for the remainder of the system

Your selection of I/O modules depends on system I/O requirements. You may want to include spares for future growth.

With your system I/O requirements in mind, select digital I/O modules from the following tables:

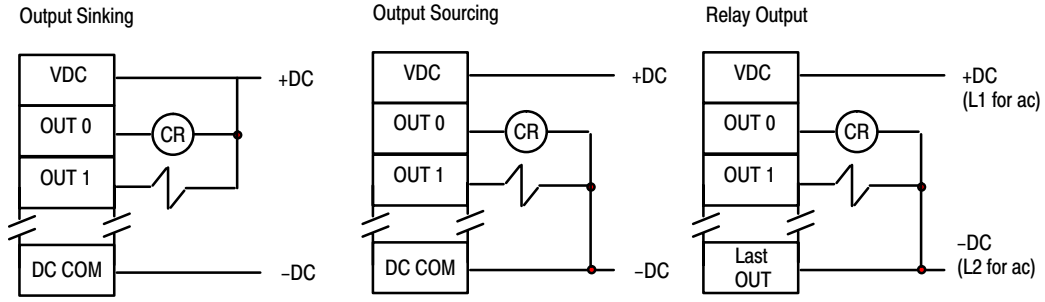
AC Input Modules			DC Input Modules			
Voltage:	**Inputs:**	**Catalog No:**	**Voltage:**	**Inputs:**	**Catalog No:**	**Signal Delay:**
100-120	4	1746-IA4	10-30 Sinking (source load)	8	1746-IB8	typical response (8 ms)
	8	1746-IA8		16	1746-IB16	typical response (8 ms)
	16	1746-IA16		16	1746-IN16	ac/dc (15 ms dc) (25 ms ac)
				16	1746-ITB16	fast response (0.5 ms typical)
				32	1746-IB32	typical response (3 ms)
200-240	4	1746-IM4	10-30 Sourcing (sink load)	8	1746-IV8	typical response (8 ms)
	8	1746-IM8		16	1746-IV16	typical response (8 ms)
	16	1746-IM16		16	1746-ITV16	fast response (0.5 ms typical)
				32	1746-IV32	typical response (3 ms)

Sinking or sourcing depends on the polarity of your dc system wiring:



AC Output & Relay Contact Modules			DC Output Modules			
Voltage:	**Inputs:**	**Catalog No:**	**Voltage:**	**Inputs:**	**Catalog No:**	**Notes:**
85-265	8	1746-OA8	10-50 Source	8	1746-OB8	general purpose
	16	1746-OA16		16	1746-OB16	general purpose
				16	1746-OBP16	20-26 vdc, high-current outputs
				32	1746-OB32	low-current outputs
Relay Contact	4	1746-OW4	10-50 Sink	8	1746-OV8	general purpose
	8	1746-OW8		16	1746-OV16	general purpose
	8	1746-OX8@		16	1746-OVP16	20-26 vdc, high-current outputs
	16	1746-OW16		32	1746-OV32	low-current outputs
@ Individually isolated high-current relay outputs						

Sinking or sourcing depends on the polarity of your dc system wiring:



Also available are these digital input/output modules:

Cat. No:	# Inputs:	Input Range:	# Outputs:	Relay Output
1746-IO4	2	85-132V ac	2	5-256V ac
1746-IO8	4	85-132V ac	4	5-256V ac
1746-IO16	8	85-132V ac	8	5-256V ac

If your application requires analog I/O modules, select them from the following table:

Cat. No:	# Inputs:	Input Specs:	# Outputs:	Output Range
1746-FIO4I	2	0-10V dc @ 0-20 mA @ 12 bit resolution 0-4095 counts 100μs response 7kHz input filter	2	0-20 mA 14-bit resolution
1746-FIO4V	2	–10 to +10V dc @ –20 to +20 mA @ 12-bit resolution 0-4095 counts 100μs response 7kHz input filter	2	–10 to +10V dc 14-bit resolution
1746-NI4	4	–10 to +10V dc @ –20 to +20 mA @ 16-bit resolution ± 16,384 counts 60 ms response 10Hz input filter	0	n/a
1746-NIO4I	2	–10 to +10V dc @ –20 to +20 mA @ 16-bit resolution ± 16,384 counts 60 ms response 10Hz input filter	2	0-20 mA 14-bit resolution
1746-NIO4V	2	–10 to +10V dc @ –20 to +20 mA @ 16-bit resolution ± 16,384 counts 60 ms response 10Hz input filter	2	–10 to +10V dc 14-bit resolution
1746-NO4I	0	n/a	4	0-20 mA 14-bit resolution
1746-NO4V	0	n/a	4	–10 to +10V dc 14-bit resolution

@ selectable input range for each channel

Compute Power for Selecting a Power Supply

Each I/O module draws specified power from the power supply. You may compute the required power by adding up the power drawn by each module. Then select the power supply that provides at least that amount of power.

Look up module power ratings in the following table. All modules have a 5V dc backplane power rating. Some also have a 24V dc backplane power rating, so examine both ratings.

Module Type:	I/O Module:	5V	24V
AC Input	IA4	0.035A	0
	IA8	0.050A	0
	IA16	0.085A	0
	IM4	0.035A	0
	IM8	0.050A	0
	IM16	0.085A	0
DC Input	IB8	0.050A	0
	IB16	0.085A	0
	ITB16	0.085A	0
	IB32	0.106A	0
	IV8	0.050A	0
	IV16	0.085A	0
	ITV16	0.085A	0
	IV32	0.106A	0
AC/DC Input	IN16	0.085A	0
Input/Output	IO4	0.035A	0.025A
	IO8	0.060A	0.045A
	IO12	0.090A	0.070A
AC Output	OA8	0.185A	0
	OA16	0.370A	0
DC Output	OB8	0.135A	0
	OB16	0.280A	0
	OBP16	0.250A	0
	OB32	0.452A	0
	OV8	0.135A	0
	OV16	0.270A	0
	OVP16	0.250A	0
	OV32	0.452A	0
Relay Contact Output	OX8	0.085A	0.090A
	OW4	0.045A	0.045A
	OW8	0.085A	0.090A
	OW16	0.170A	0.180A
SLC Processor	SLC 5/02	0.350	0.105
	SLC 5/03	0.500	0.175
	SLC 5/04	1.00A	0.200A

Important: You must include the power requirements of the processor and any other I/O modules in the chassis.

Select the power supply from the following table:

Line	5V dc	24V dc	Pwr Sply Cat. No:
120/240V ac	2.0A	0.46A	1746-P1
	5.0A	0.96A	1746-P2
	10.0A	2.88A	1746-P4
24Vdc	3.6A	0.87A	1746-P3

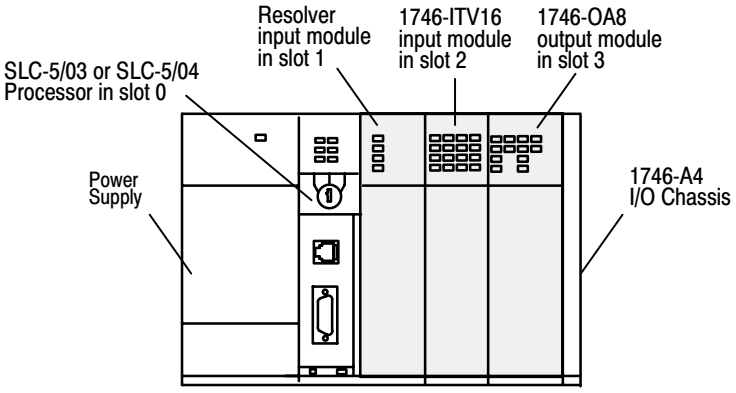
Hardware Requirements for an Example Stand-alone PLS/DM

Although system requirements may vary considerably, we present an example PLS/DM system with the following hardware configuration:

- resolver input
- up to 16 DM input channels
- up to 8 PLS output channels

To Monitor / Control	Use This Type of Module	Example Cat. No:
crankshaft rotation	resolver input	Helm HN571-RES
switch inputs for DM	ac digital input	1746-ITV16
solenoids and relays for PLS	ac digital output	1746-OA8

For the I/O chassis, the 1746-A4 holds three I/O modules.
Other sizes: 1746-A7, -A10, and -A13 (for 6, 9, and 12 I/O modules).


Resolver input module in slot 1
1746-ITV16 input module in slot 2
1746-OA8 output module in slot 3
SLC-5/03 or SLC-5/04 Processor in slot 0
Power Supply
1746-A4 I/O Chassis

For the power supply, the 1746-P1 meets the 5V and 24V requirements.

Module	5V	24V
SLC-5/03	0.500A	0.175A
resolver (est.)	0.049A	0.057
1746-ITV16	0.085A	0
1746-OA8	0.185A	0
Total	**0.819A**	**0.232A**

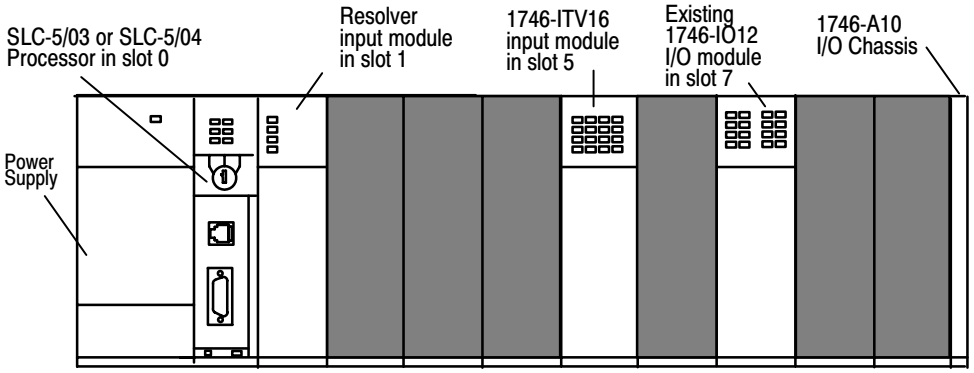
Now you can assign addresses to DM and PLS channels. For example:

Slot #	Chnl #	Function / Purpose	Address
1	n/a	resolver input	I:1 (word)
2	1	DM cyclic mode, part passed check point 1	I:2/0 (bit)
	2	DM track mode, for robot arm	I:2/1
	3	DM single-part-detect, part in die zone 1	I:2/2
3	1	PLS output, activate surface lub for die zone 1	O:3/0 (bit)
	2	PLS output for track mode, start robot arm	O:3/1
	3	PLS output, eject part from die zone 1	O:3/2

Hardware Requirements for an Example PLS/DM and Clutch/Brake System

When combined with clutch/brake control software (cat. no. 6556-SCB), the minimum size I/O chassis is nine I/O slots (1746-A10) and slot locations for PLS/DM are pre-assigned as follows:

Slot #:	Contains This Module:	To Process:
1	resolver input (existing)	signals from the resolver
5	1746-ITV16	up to 16 DM inputs
7	1746-IO12 (existing)	up to 4 PLS outputs



The largest available I/O chassis (cat. no. 1746-A13) provides 12 I/O slots. If needed, you may expand to 30 I/O slots by adding more chassis.

Add up the power drawn by all modules including the SLC processor in the I/O chassis, and select the power supply accordingly.

Now you can assign addresses to DM and PLS channels. The preassigned outputs for PLS in slot 7 are outputs 4-7. For example:

Slot #	Chnl #	Function / Purpose	Address
1	n/a	resolver input	I:1 (word)
5	1	DM cyclic mode, part past check point 1	I:5/0 (bit)
	2	DM track mode, for robot arm	I:5/1
	3	DM single-part-detect, part in die zone 1	I:5/2
	4	DM cyclic mode, part past check point 2	I:5/3
	5	DM single-part-detect, part in die zone 2	I:5/4
7	1	PLS output, activate surface lub for die zone 1	O:7/2 (bit)
	2	PLS output for track mode, start robot arm	O:7/3
	3	PLS output, eject part from die zone 1	O:7/4
	4	PLS output, eject part from die zone 2	O:7/5

If you need to need more I/O capacity and use the 12-slot I/O chassis, addresses for channels in slots 10, 11, and 12 will be in the format:

Slot #	Address	Slot #	Address	Slot #	Address
10	I:10/xx (bit)	11	I:11/xx (bit)	12	I:12/xx (bit)

Hardware Requirements for an Example PLS/DM with Other Logic

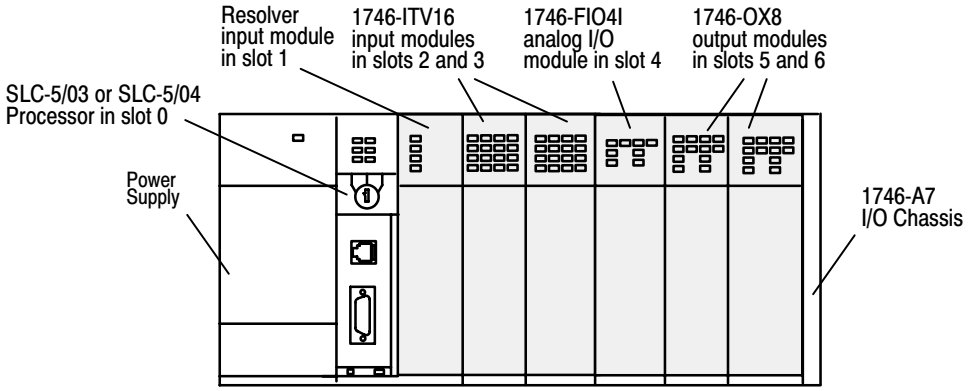
If your application required PLS/DM with additional logic for machine automation, the control system would depend on the number and type of I/O modules required in addition to those for the stand-alone PLS/DM previously described. For example, suppose your total system required:

- resolver input
- 15 DM digital input channels
- 1 DM analog input channel
- 9 PLS output channels
- 1 analog input and 2 analog outputs (system)
- 12 other switch inputs
- 7 other relay outputs

You could select the following type and quantity of I/O modules:

To Monitor / Control	With Module Qty & Type	Example Cat. No:
crankshaft rotation	1 resolver input	unspecified
switch inputs	2 16-point ac digital input	1746-ITV16
solenoids and relays	2 8-point ac digital output	1746-OX8
analog inputs and outputs	1 analog I/O	1746-FIO4I

For the I/O chassis, the 1746-A7 holds six I/O modules plus processor.


Resolver input module in slot 1
1746-ITV16 input modules in slots 2 and 3
1746-FIO4I analog I/O module in slot 4
1746-OX8 output modules in slots 5 and 6
SLC-5/03 or SLC-5/04 Processor in slot 0
Power Supply
1746-A7 I/O Chassis

For the power supply, the 1746-P2 is required for the 24V requirement.

Module	5V	24V
1 SLC-5/04	1.000A	0.200A
1 resolver (est.)	0.300A	0
2 1746-ITV16	0.170A	0
2 1746-OX8	0.170A	0.180
1 FIO4I	0.055A	0.195A
Total	**1.695**	0.575

Now you can assign addresses to DM and PLS channels and to your system I/O. For example (with this total I/O requirement):

- resolver input
- 15 DM digital input channels
- 1 DM analog input channel
- 12 other switch inputs (non-DM/PLS functions)
- 1 analog input and 2 analog outputs (non-DM/PLS functions)
- 9 PLS output channels
- 7 other relay outputs (non-DM/PLS functions)

Slot #	Chnl #	Function / Purpose	Address
1	n/a	resolver input	I:1 (word)
2	1	DM input 1	I:2/0 (bit)
	2	DM input 2	I:2/1
	:	:	:
	15	DM input 15	I:2/14
	n/a	spare	
3	n/a	other switch input 1 (non-DM/PLS function)	I:3/0
	:	:	:
	n/a	other switch input 12 (last) (non-DM/PLS function)	I:3/11
	n/a	four spare inputs	I:3/12-15
4	16	DM analog input channel	I:4.0 (word)
	n/a	system analog input (non-DM/PLS function)	I:4.1
	n/a	system analog output 1 (non-DM/PLS function)	O:4.0
	n/a	system analog output 2 (non-DM/PLS function)	O:4.1
5	1	PLS output 1	O:5/0 (bit)
	2	PLS output 2	O:5/1
	:	:	:
	8	PLS output 8	O:5/7
6	9	PLS output 9 (last)	O:6/0 (bit)
	n/a	system output 1 (non-DM/PLS function)	O:6/1
	:	:	:
	n/a	system output 7 (last) (non-DM/PLS function)	O6:7

Considerations When Setting Up Analog Channels

DM software lets you configure any channel for digital or analog operation and assign an analog address of your choice to any channel. You match the analog address to the analog channel in chapter 8.

You decide how many analog channels you need, from *none* up to 16. Whether the channel *can process* analog data depends on whether you:

- assign a slot for an analog input module
- program the transfer of analog data to the pre-assigned area of the data table reserved for DM analog inputs (chapter 8)

If your application requires only a few analog channels, we suggest that you number them backwards from channel 16 for easier record keeping.

You may want to set up some analog channels now, even if your current application does not require them.

Important: If not set up but required later, you must re-configure your I/O hardware (this chapter) and software (chapter 8). If set up but not used, install the analog module in your assigned I/O slot and program the transfer of analog data. (Your ladder logic cannot address an empty module slot without faulting the processor, unless you disable the slot.)

List I/O Functions on Pre-addressed Worksheets

The DM/PLS software uses pre-assigned files in the data table to store active DM inputs and PLS outputs. Because we give you the flexibility to place I/O modules in any slot location, you must write ladder logic to move I/O signals between I/O image table addresses (based on slot locations) and pre-assigned files used by the DM/PLS software.

We suggest that you use our pre-addressed worksheets to accurately record your hardware-based I/O image table addresses. Worksheets will be helpful later when writing ladder logic (chapters 8-10).

Worksheet C for DM Inputs & I/O Addresses

Slot # ____ / Bit #

Job # Name

Chnl #	DM Input Function / Purpose	Address
1		I:__/__
2		I:__/__
3		I:__/__
4		I:__/__
5		I:__/__
6		I:__/__
7		I:__/__
8		I:__/__
9		I:__/__
10		I:__/__
11		I:__/__
12		I:__/__
13		I:__/__
14		I:__/__
15		I:__/__
16		I:__/__

Worksheet D for PLS Outputs & I/O Addresses

Slot # _____ / Bit #

Job # Name

Chnl #	PLS Output Function / Purpose	Address
1		O:__/__
2		O:__/__
3		O:__/__
4		O:__/__
5		O:__/__
6		O:__/__
7		O:__/__
8		O:__/__

Worksheet D for PLS Outputs & I/O Addresses

Slot # _____ / Bit #

Job # Name

Chnl #	PLS Output Function / Purpose	Address
1		O:__/__
2		O:__/__
3		O:__/__
4		O:__/__
5		O:__/__
6		O:__/__
7		O:__/__
8		O:__/__

Worksheet E for Other Inputs & I/O Addresses

Slot # ____ / Bit #

Job # Name

Chnl #	Input Function / Purpose	Address
1		I:__/__
2		I:__/__
3		I:__/__
4		I:__/__
5		I:__/4__
6		I:__/__
7		I:__/__
8		I:__/__
9		I:__/__
10		I:__/__
11		I:__/__
12		I:__/__
13		I:__/__
14		I:__/__
15		I:__/__
16		I:__/__

Worksheet F for Other Outputs & I/O Addresses

Job # Name

Slot # ____ / Bit #

Chnl #	Output Function / Purpose	Address
1		O:__/__
2		O:__/__
3		O:__/__
4		O:__/__
5		O:__/__
6		O:__/__
7		O:__/__
8		O:__/__
9		O:__/__
10		O:__/__
11		O:__/__
12		O:__/__
13		O:__/__
14		O:__/__
15		O:__/__
16		O:__/__

Notes:

Installing Your Software

Chapter Objective

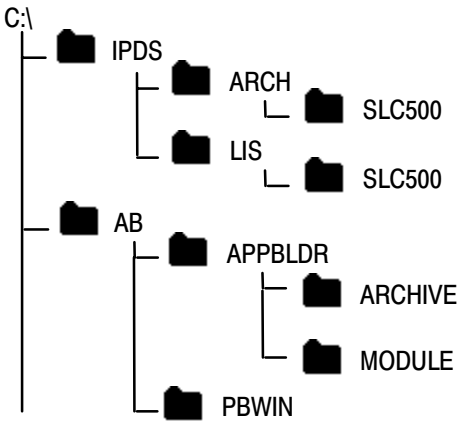
We show you how to install PLS/DM diskettes on you conputer's hard drive.

How the Installation of PLD/DM Software Affects Your Hard Drive

When you install PLS/DM software, it:

- creates a work directory
- decompresses PLS/DM software files
- copies them onto hard disk
- creates a program group named Allen-Bradley if not already created

It also creates the following directories and subdirectories for storing associated ladder program files.



PLS/DM software uses approximately 3 MByte of disk storage.

Installing PLS/DM Software

The Install program, located on the distribution diskette, copies the PLS/DM software files onto your hard disk.

Important: Install APS software if you have not already done so.

To install PLS/DM software:

1. Place the PLS/DM software diskette in the computer system's floppy disk drive.
2. Start Windows by typing **`win`** **ENTER** at the C:\ prompt:.
3. From the File menu, select Run.
   The Run dialog box appears.

4. In the command line buffer, type: **`a:\setup`** and press **ENTER**.
   (The letter **a** represents the disk drive into which you placed the PLS/DM software diskette in step 1 above.)

NOTE: The **PLS/DM Installation Program** screen appears and installation begins.

Follow instructions on the screen for steps 5-8.
(We show the steps for a first-time installation.)

Step:	When you see this prompt:	Do this:
5	Please enter the location for SLC Ladder Files	Click on OK, or type in a new location
6	Please enter the location for SLC ASCII Files.	Click on OK.
7	Please enter the location for PanelBuilder Files.	Click on OK.
8	Installation Is Complete	Click on OK.

Programming Strategy

Objectives

This chapter gives you an overview of the ladder logic that you must write to make the system work.

We also show you how program files are organized depending on whether you are using PLS/DM software:

- as a stand–alone control
- with Allen–Bradley clutch/brake software (6556-SCB)

Strategy for Writing Your Ladder Logic

Because of the flexible arrangement of I/O with SLC-500 products, you must write ladder logic to make input signals available to the software, and send software-controlled signals to output devices.

We help you write ladder logic to achieve these objectives in the following chapters:

We Cover these Programming Objectives:	in:
• Move DM input signals into the data table • Program other software inputs • Program DM outputs	chapter 8
• Move resolver input signals into the data table • Program PLS outputs	chapter 9
• Move counter input signals into the data table • Program counter outputs	chapter 10
• Set up parameters to compensate for press speed	chapter 11

PLS/DM as Stand-alone Software

PLS/DM software provides you with a program file to use for writing the ladder logic required PLS and/or DM inputs. We have reserved program file PF14 for this purpose.

You may program PLS outputs in PF14. However, if combining your PLS/DM software with the Clutch/Brake system (cat. no. 6556-SCB), we recommend that you program PLS outputs in FP15, reserved for programming the clutch/brake interface.

Although available to you, the remaining program files are pre-programmed as follows:

- PF2 for the master control program
- PF10 for DM channels 1-8
- PF11 for DM channels 9-16
- PF12 for PanelView and part-file management
- PF31 for PLS channels 1-16

Program Scan for Stand-alone PLS/DM Software

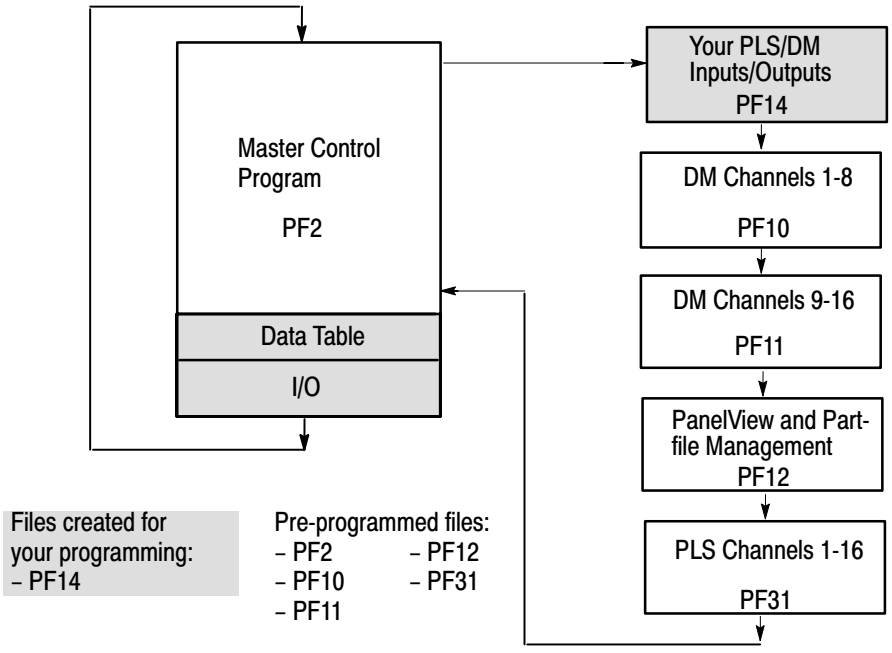
Subdividing ladder logic into subroutine program files has benefits such as:

- easier to understand and troubleshoot
- faster scan time because the processor scans only the "called" subroutines

We subdivided PLS/DM software into these subroutine program files (abbreviated with PFxx):

This programming function:	Uses:
Master Control Program	PF2
DM Channels 1-8	PF10
DM Channels 9-16	PF11
PanelView and Part-file Management	PF12
PLS/DM Inputs and Outputs that you program	PF14
PLS Channels 1-16	PF31

The SLC processor scans program files, data table, and I/O as follows for stand-alone PLS/DM software as follows:



PLS/DM Used with Clutch/Brake Software

Clutch/brake software has its own set of subroutine program files. When you combine PLS/DM software with clutch/brake software, we recommend that you use two program files for writing the ladder logic required to suit your application:

- for PLS and/or DM inputs, use PF14
- for PLS and/or DM outputs, use PF15

PF15 is a file that shares your PLS/DM outputs and your clutch/brake interface logic. This program file resides in both of the processors that control the clutch/brake mechanism. We recommend that you add your PLS/DM logic to PF15 in only one processor, and refer you the clutch/brake design manual for more information.

The remainder of program files are pre-programmed.
We recommend that you do not edit them.

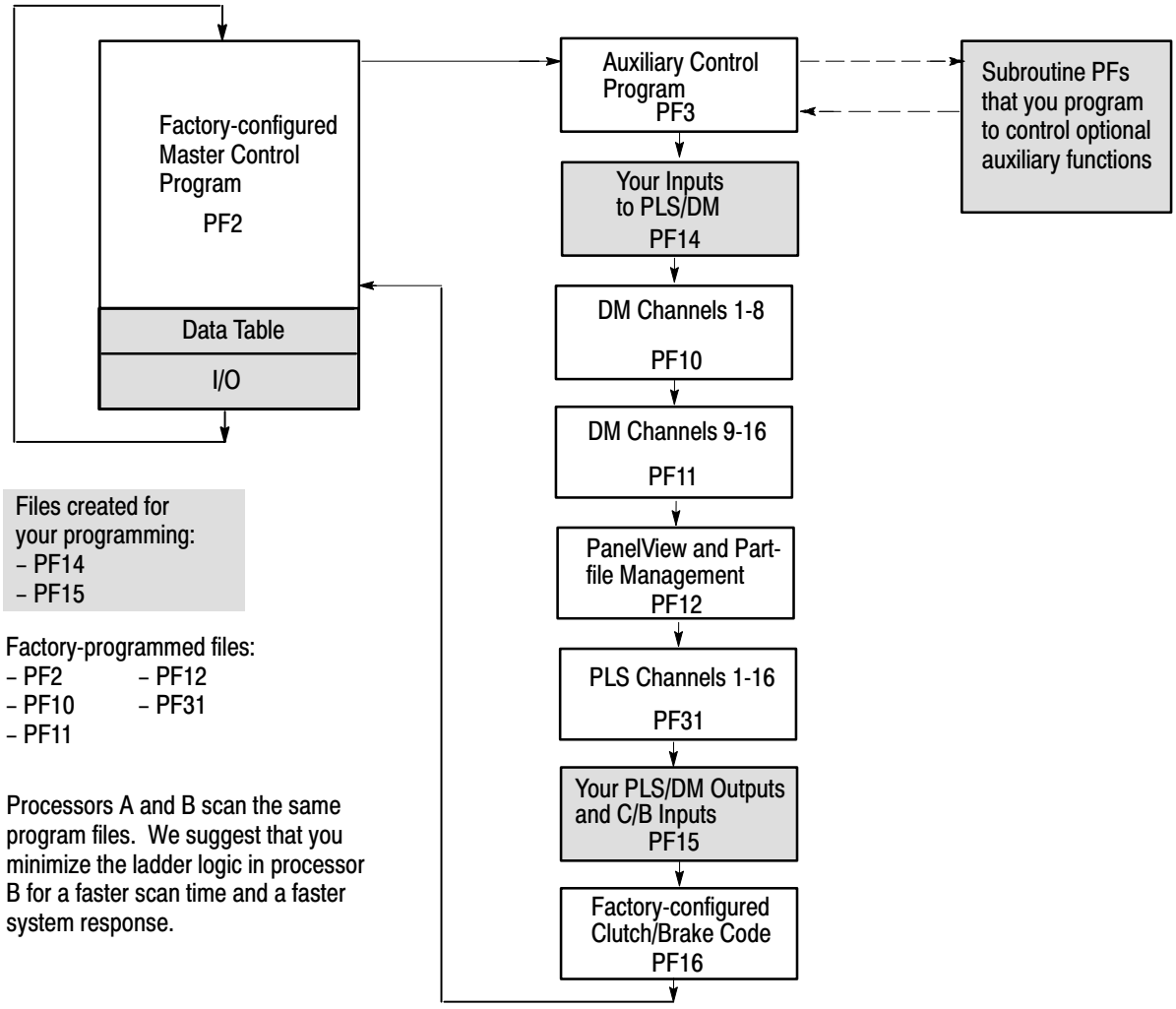
- PF2 for the master control program
- PF3 auxiliary control program (set up by ApplicationBuilder)
- PF10 for DM channels 1-8
- PF11 for DM channels 9-16
- PF12 for PanelView and part-file management
- PF16 for the clutch/brake code
- PF31 for PLS channels 1-16

Program Scan for Combined PLS/DM and C/B Software

We subdivided PLS/DM and C/B software into these subroutine program files (PFxx):

This programming function:	Uses:
Master Control Program	PF2
Auxiliary Control Program	PF3
DM Channels 1-8	PF10
DM Channels 9-16	PF11
PanelView and Part-file Management	PF12
Your Inputs to PLS/DM	PF14
Your PLS/DM Outputs and C/B Interface	PF15
C/B Code	PF16
PLS Channels 1-16	PF31

The SLC processor scans program files, data table, and I/O as follows for the combined PLS/DM and C/B software:



Files created for your programming:
- PF14
- PF15

Factory-programmed files:
- PF2
- PF10
- PF11
- PF12
- PF31

Processors A and B scan the same program files. We suggest that you minimize the ladder logic in processor B for a faster scan time and a faster system response.

Programming DM Data

Objectives

This chapter shows you how to move data from DM hardware addresses into the data table so the DM software can access them. This programming gives you the flexibility to place I/O modules in any available slot location and use inputs for DM from anywhere in your controller. We also show you how to program DM outputs.

We cover these tasks:

- Mapping DM hardware addresses into the data table
- Writing ladder logic to move DM inputs into the data table
- Programming other inputs to DM software
- Programming DM outputs

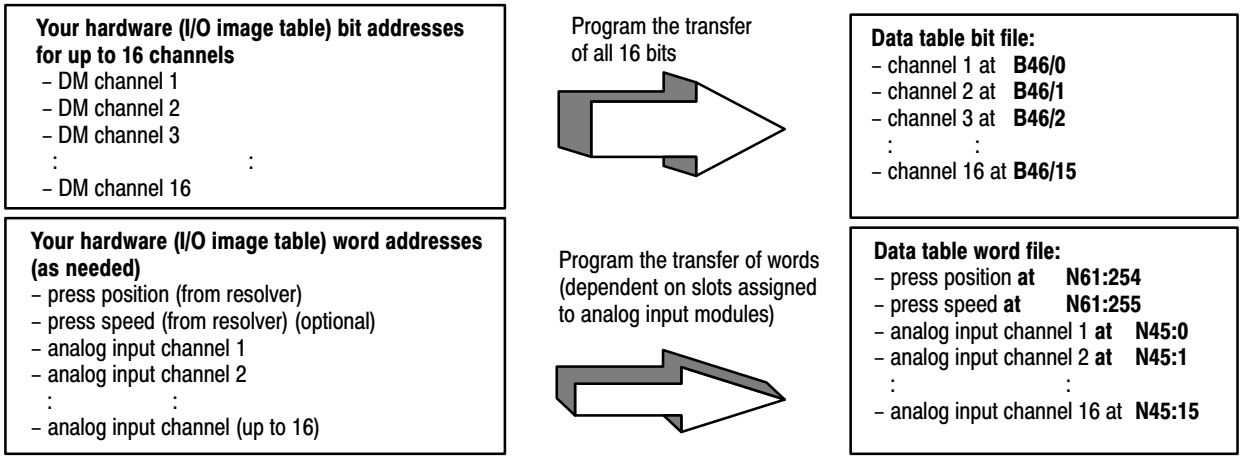
Important: If you allow for spare DM channels, you can easily enlarge your DM capability in the future.

Important: To improve system thru-put, we recommend that you program DM inputs in program file PF14 and DM outputs in PF15.

Mapping DM Hardware Addresses into the Data Table

The pre-assigned areas of the data table, reserved for DM signals and accessed by DM software, are a bit file and a word file. Your hardware I/O configuration (including spares) determines how many bits of the bit file and words of the word file will be used. You store:

- DM switch inputs in the bit file, one bit per channel
- Resolver inputs (press position and speed) in the word file
- DM analog inputs in the word file, one word per channel


Your hardware (I/O image table) bit addresses for up to 16 channels
– DM channel 1
– DM channel 2
– DM channel 3
:
– DM channel 16
Your hardware (I/O image table) word addresses (as needed)
– press position (from resolver)
– press speed (from resolver) (optional)
– analog input channel 1
– analog input channel 2
:
– analog input channel (up to 16)
Program the transfer of all 16 bits
Program the transfer of words (dependent on slots assigned to analog input modules)
Data table bit file:
– channel 1 at B46/0
– channel 2 at B46/1
– channel 3 at B46/2
:
– channel 16 at B46/15
Data table word file:
– press position at N61:254
– press speed at N61:255
– analog input channel 1 at N45:0
– analog input channel 2 at N45:1
:
– analog input channel 16 at N45:15

Important: For a complete data table map, refer to appendix A.

Writing Ladder Logic to Move DM Inputs into the Data Table

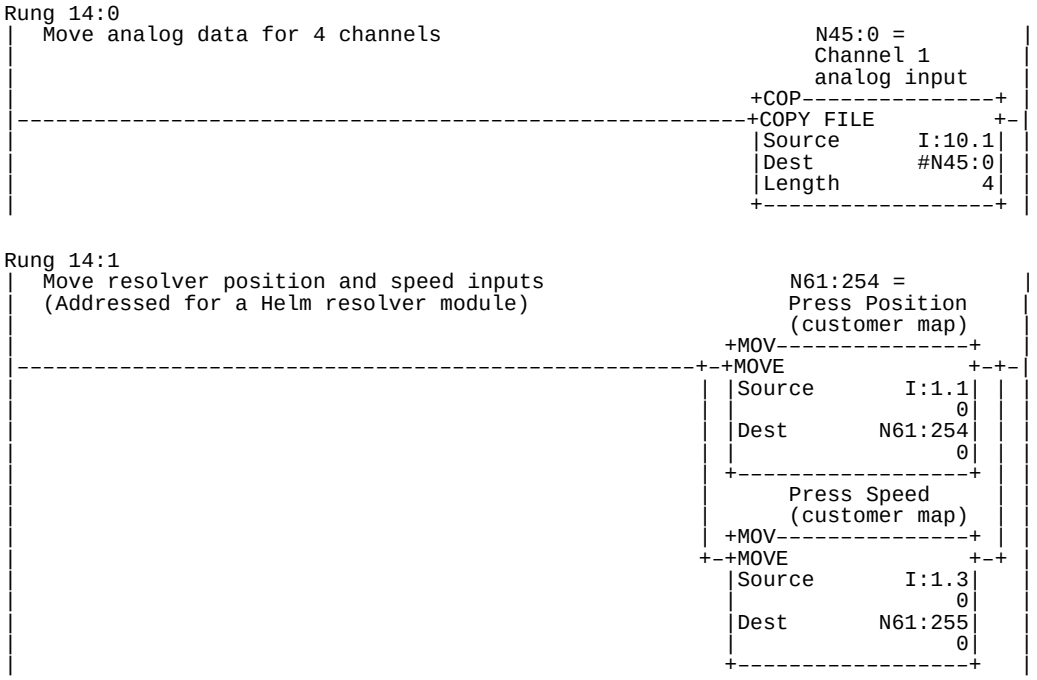
You can move DM data with Examine/Execute, Copy, and/or Move instructions. The bits and/or words of I/O image table to be moved and their addresses depend on the hardware I/O configuration that you determined in chapter 5. For example:

From hardware (I/O image) addresses			To PLS data table
Bit/Word Description:	**Slot:**	**Source Address:**	**Destination Address:**
resolver (press position)	1	I:1.1[1]	N61:254
resolver (press speed)		I:1.2[2] I:1.3[3]	N61:255
16 bits for channels 1-16	5	I:5/0, I5/1, . . . I:5/15	B46/0, B46/1, . . B46/15
analog input 1	10	I:10.1	N45:0
analog input 2		I:10.2	N45:1
analog input as needed		I:10.3, I:10.4, . . .	up to N45:15
[1] when using an AMCI or Helm resolver input module in Slot 1 of the I/O chassis			
[2] when using an AMCI series 1500 resolver input module in slot 1			
[3] when using a Helm resolver input module in slot 1			

We pre-programmed Copy (COP), Move (MOV), and Examine/Execute (XIC/OTE) instructions in PF14 to move the data into the pre-assigned DM data table. Edit them to suit your application.

Important: Edit these instructions with the addresses of your I/O. Refer to hardware addresses that you wrote down on Worksheets in chapter 5.

Important: Do not write ladder logic addressed from *empty* slot locations. The processor will fault unless you disable the slot.



```
Rung 14:2
|  Move DM input channel bit status                                          |
|  CHANNEL 1 INPUT |                                          CHANNEL 1 INPUT |
|  (customer Map)  |                                           (customer Map) |
|    I:5                                                             B46     |
|----] [-------------------------------------------------------------( )-----|
|       0                                                              0     |

Rung 14:3
|  Move DM input channel bit status                                          |
|  CHANNEL 2 INPUT |                                          CHANNEL 2 INPUT |
|  (customer Map   |                                           (customer Map) |
|    I:5                                                             B46     |
|----] [-------------------------------------------------------------( )-----|
|       1                                                              1     |

Up To

Rung 14:17
|  Move DM input channel bit status                                          |
|  CHANNEL 16 INPUT |                                        CHANNEL 16 INPUT |
|  (customer Map)   |                                          (customer Map) |
|    I:5                                                             B46     |
|----] [-------------------------------------------------------------( )-----|
|      15                                                             15     |
```

Programming Other Software Inputs

We present the following control bits that you can program in PF14 for the desired response. Some are required. Others are optional.

For DM Exclusively		
Use this Bit:	**at Addr:**	**To:**
XFR-mode 1st input	B46:105	program an up-stream 1st input (alternative to 1st channel with by-passed output)
XFR-mode Resume Operation	B46:106	re-initialize memory with “snap-shot” logic status (Use with separate restart logic.)
Fault Reset	B46:101	reset fault logic and message after clearing a fault (Required programming.)
For DM and/or PLS		
Overwrite Active File	B46:107	download a part file that overwrites active job (Recognize consequences and take precautions.)
Enable Edits	B46:100	allow editing of a stored or active part file (For password access)

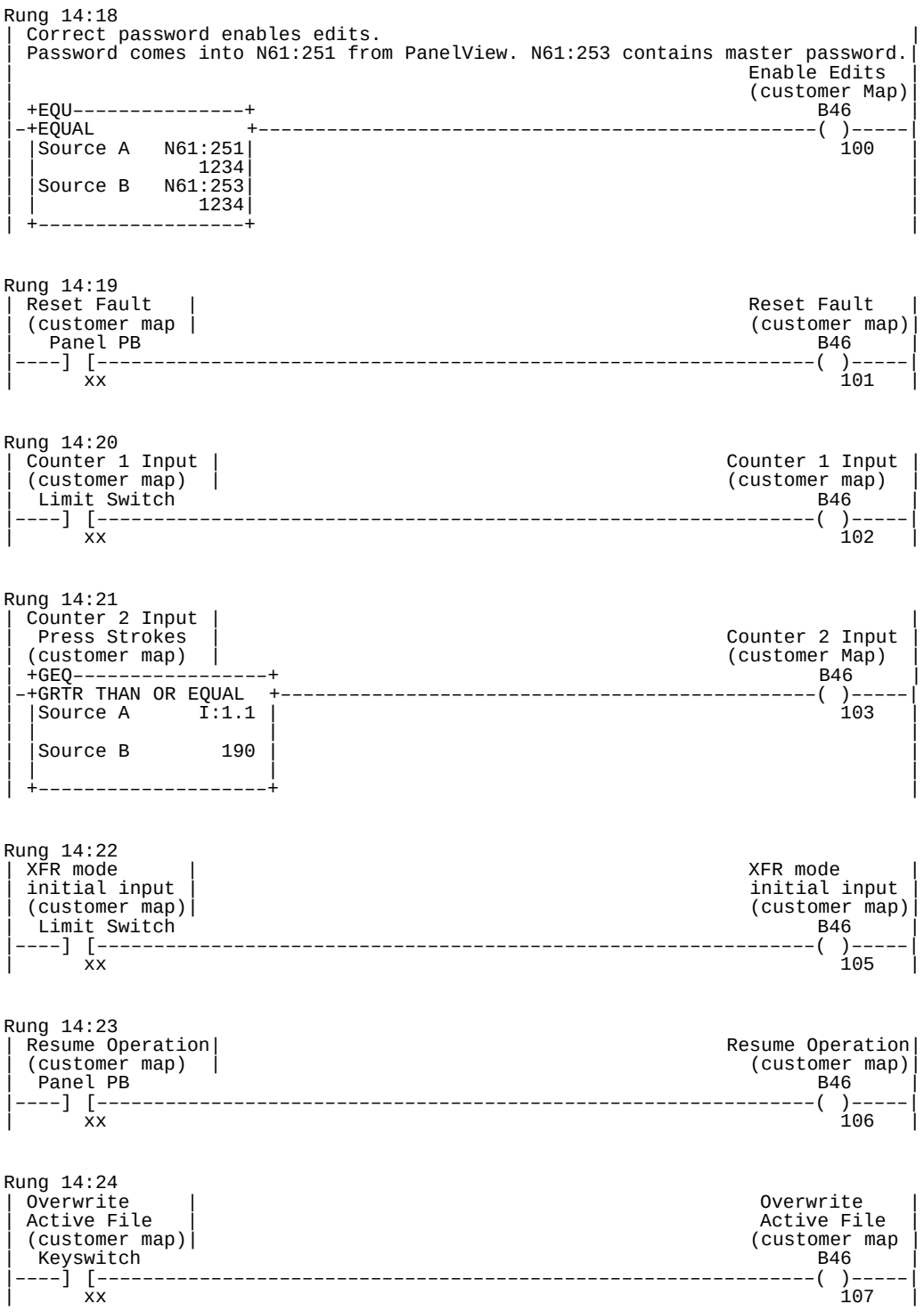
These five bits are pre-programmed in PF14. We suggest that you:

- modify each rung by adding input conditions according to your application requirements
- deleting the entire rung if that function is not required

Important: Edit these instructions with the addresses of your I/O. Refer to hardware addresses that you wrote down on worksheets in chapter 5.

Important: Do not write ladder logic to MOVE words from *empty* slot locations. The processor will fault unless you disable the slot.

For example:


Rung 14:18
Correct password enables edits.
Password comes into N61:251 from PanelView. N61:253 contains master password.
Enable Edits (customer Map)
EQU
EQUAL
Source A N61:251 1234
Source B N61:253 1234
B46 100
Rung 14:19
Reset Fault (customer map)
Panel PB
xx
Reset Fault (customer map)
B46 101
Rung 14:20
Counter 1 Input (customer map)
Limit Switch
xx
Counter 1 Input (customer map)
B46 102
Rung 14:21
Counter 2 Input
Press Strokes (customer map)
GEQ
GRTR THAN OR EQUAL
Source A I:1.1
Source B 190
Counter 2 Input (customer Map)
B46 103
Rung 14:22
XFR mode initial input (customer map)
Limit Switch
xx
XFR mode initial input (customer map)
B46 105
Rung 14:23
Resume Operation (customer map)
Panel PB
xx
Resume Operation (customer map)
B46 106
Rung 14:24
Overwrite Active File (customer map)
Keyswitch
xx
Overwrite Active File (customer map
B46 107

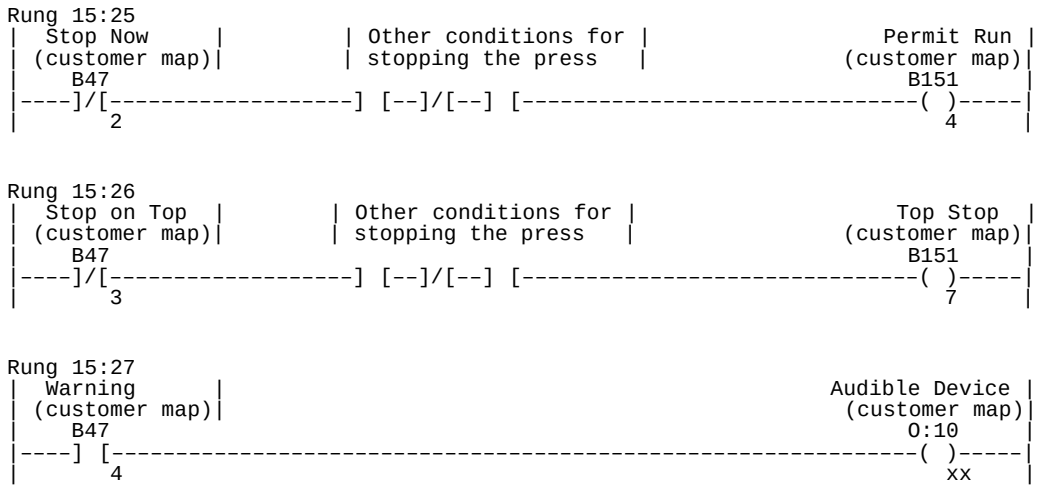
Programming DM Outputs

When you set up the operation of your channels with software screen displays (chapter 13), you determine how you want each DM channel output to respond to a detected fault. Channel responses and corresponding fault bits are:

- stop now bit B47/2 (for use with clutch/brake control)
- stop on top bit B47/3 (for use with clutch/brake control)
- warning bit B47/4

Write your ladder logic to examine each of the three types of fault bits that you selected for your DM output channels. Our examples show the programming of clutch/brake interface bits Permit Run and Top Stop, as well as the Warning.

Program your output responses in program file PF15.



Notes:

Programming PLS Data

Objectives

This chapter shows you how to move data from the resolver input module into the data table so the PLS software can access it. We also show you how to move output signals from the data table to hardware addresses. This programming gives you the flexibility to place I/O modules in any available slot location and send PLS outputs to anywhere in your controller.

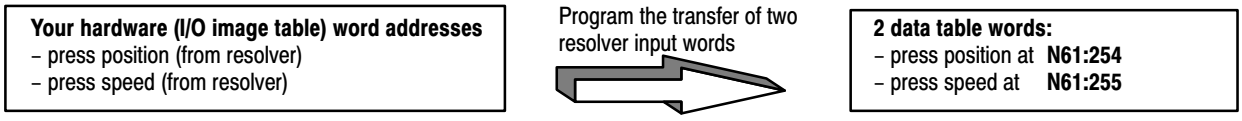
We cover these tasks:

- Mapping resolver inputs into the data table
- Writing ladder logic to move resolver inputs into the data table
- Mapping PLS outputs to hardware addresses
- Programming PLS outputs

Important: To improve system thru-put, we recommend that you program PLS inputs (press position and speed) in program file PF14 and PLS outputs in PF15.

Mapping Resolver Inputs into the Data Table

Two data table words are reserved for resolver input signals. They are the same for PLS and DM software. If you programmed them in chapter 8 for DM, you need not program them again.


Your hardware (I/O image table) word addresses
– press position (from resolver)
– press speed (from resolver)
Program the transfer of two resolver input words
2 data table words:
– press position at N61:254
– press speed at N61:255

Important: For a complete data table map, refer to appendix A.

Writing Ladder Logic to Move Resolver Inputs into the Data Table

You can program the transfer of resolver input signals with a File Move (MOV) instruction. The words of I/O image table to be moved and their addresses depend on the slot location of the resolver input module. For example:

From hardware (I/O image) addresses			To PLS data table
Word Description:	**Slot:**	**Source Address:**	**Destination Address:**
resolver (press position)	1	I:1.1[1]	N61:254
resolver (press speed)		I:1.2[2] I:1.3[3]	N61:255
[1] when using an AMCI or Helm resolver input module in slot 1 of the I/O chassis			
[2] when using an AMCI series 1500 resolver input module in slot 1			
[3] when using a Helm resolver input module in slot 1			

We pre-programmed Move (MOV) instructions in PF14 to move the data into the pre-assigned data table area (see below).

Important: If you have not already done so for DM (chapter 8), edit these instructions with the addresses of your I/O. Refer to hardware addresses that you wrote down on your Worksheet in chapter 5.

Important: Do not write ladder logic to MOVE words from *empty* slot locations. The processor will fault unless you disable the slot.

```
Rung 14:1
|  Move resolver position and speed inputs                    N61:254 =          |
|  (Addressed for a Helm resolver module)                     Press Position     |
|                                                             (customer map)     |
|                                                   +MOV---------------+         |
|---------------------------------------------------+-+MOVE              +-+-|
|                                                   | |Source       I:1.1| | | |
|                                                   | |                  0| | | |
|                                                   | |Dest        N61:254| | | |
|                                                   | |                   0| | | |
|                                                   | +--------------------+ | | |
|                                                   |      Press Speed       | | |
|                                                   |      (customer map)    | | |
|                                                   | +MOV---------------+ | | |
|                                                   +-+MOVE                +-+ | |
|                                                     |Source       I:1.3|     | |
|                                                     |                  0|     | |
|                                                     |Dest        N61:255|     | |
|                                                     |                  0|     | |
|                                                     +-------------------+     |
```

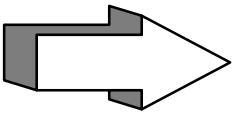
Mapping PLS Outputs to Hardware Addresses

You can map the pre-assigned area of the data table, reserved for PLS channel outputs, to hardware addresses in the I/O image table. This lets you match PLS channel outputs to the output points of the one or more output modules in slot locations of your choice. For example:

Data table bit file for PLS outputs:
- PLS channel 1 output at **B146/0**
- PLS channel 2 output at **B146/1**
- PLS channel 3 output at **B146/2**

up to
- PLS channel 16 output at **B146/15**

Program the transfer of PLS output bits



Your hardware (I/O image table) slot/point addresses
- output point 1
- output point 2
- output point 3

for designated slot locations

up to
- output point 16

Programming PLS Outputs

When programming the transfer of PLS output bits to your hardware addresses, you must first have determined the slot location(s) and number of output points (terminals) of your assigned PLS outputs. They determine your destination hardware addresses.

From PLS data table	To hardware (I/O image) addresses		
XIC Address:	To this Module:	in Slot:	with OTE Addresses:
B146.0 (move bits 0-3)	existing 1746-OA8 output module	7	O:7/0 – O:7/3
B146.0 (move bits 4-15)	new 1746-OA16 output module	10	O:10/0 – O:10/11

Program XIC/OTE instructions in PF15 to move PLS outputs from the pre-assigned data table area to hardware addresses, (see below).

Important: Edit these instructions with the addresses of your I/O. Refer to hardware addresses that you wrote down on a Worksheet in chapter 5.

Important: Do not write ladder logic addressed to *empty* slot locations. The processor will fault unless you disable the slot.

```
Rung 15:28
|  PLS Channel 1 |                                                  PLS Output 1 |
| (customer map) |                                                 (customer map)|
|    B146                                                               O:7     |
|----] [-------------------------------------------------------------------( )-----|
|       0                                                                 0     |


Rung 15:29
|  PLS Channel 2 |                                                  PLS Output 2 |
| (customer map) |                                                 (customer map)|
|    B146                                                               O:7     |
|----] [-------------------------------------------------------------------( )-----|
|       1                                                                 1     |


Up To

Rung 15:31
|  PLS Channel 4 |                                                  PLS Output 4 |
| (customer map) |                                                 (customer map)|
|    B146                                                               O:7     |
|----] [-------------------------------------------------------------------( )-----|
|       3                                                                 3     |


Rung 15:32
|  PLS Channel 5 |                                                  PLS Output 5 |
| (customer map) |                                                 (customer map)|
|    B146                                                              O:10     |
|----] [-------------------------------------------------------------------( )-----|
|       4                                                                 0     |


Rung 15:33
|  PLS Channel 6 |                                                  PLS Output 6 |
| (customer map) |                                                 (customer map)|
|    B146                                                              O:10     |
|----] [-------------------------------------------------------------------( )-----|
|       5                                                                 1     |


Up To

Rung 15:43
|  PLS Channel 16|                                                  PLS Output 16|
| (customer map) |                                                 (customer map)|
|    B146                                                              O:10     |
|----] [-------------------------------------------------------------------( )-----|
|       15                                                                11    |
```

Notes:

Programming Your Counters

Objectives

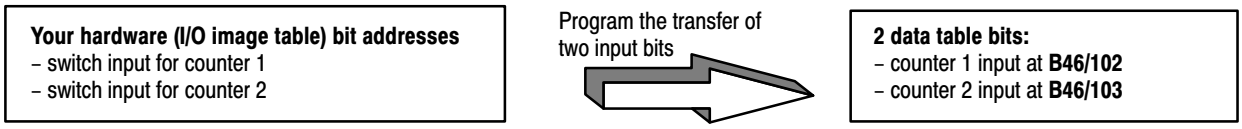
This chapter shows you how to program the two counters included in the PLS/DM software. We cover these tasks:

- Mapping counter inputs into the data table
- Writing ladder logic to move counter inputs into the data table
- Mapping counter outputs to hardware addresses
- Programming counter outputs

Important: To improve system thru-put, we recommend that you program PLS inputs in program file PF14 and PLS outputs in PF15.

Mapping Counter Inputs into the Data Table

Two data table bits are reserved for incrementing your counters. Each time a counter input switch closes, the counter accumulated value increments by one count.


Your hardware (I/O image table) bit addresses
– switch input for counter 1
– switch input for counter 2
Program the transfer of two input bits
2 data table bits:
– counter 1 input at B46/102
– counter 2 input at B46/103

Important: For a complete data table map, refer to appendix A.

Writing Ladder Logic to Move Counter Inputs into the Data Table

You can transfer counter input signals into the data table with Examine/Execute instructions. The bits of I/O image table to be transferred and their addresses depend on the slot location and input points of the input module to which counter switch inputs are connected. For example:

From hardware (I/O image) addresses			To counter data table
Bit Description:	**Slot:**	**XIC (Source) Address:**	**OTE (Destination) Address:**
Counter 1 Input Bit	5	I:5/14	B46/102
Counter 2 input Bit		I:5/15	B46/103

We pre-programmed instructions in PF14 to move counter inputs into the pre-assigned data table area (see below).

Important: If you have not already done so in chapter 8 for DM, edit these instructions with the addresses of your I/O. Refer to hardware addresses that you wrote down on a Worksheet in chapter 5.

Important: Do not write ladder logic addressed from *empty* slot locations. The processor will fault unless you disable the slot.

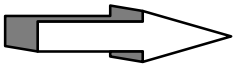
```
Rung 14:20
| Counter 1 Input |                                                    Counter 1 Input |
| (customer map)  |                                                    (customer map)  |
|  Limit Switch                                                             B46     |
|----] [-------------------------------------------------------------------( )-----|
|      xx                                                                   102     |


Rung 14:21
| Counter 2 Input |                                                                    |
|  Press Strokes  |                                                    Counter 2 Input |
| (customer map)  |                                                    (customer Map)  |
| +GEQ----------------+                                                     B46     |
|-+GRTR THAN OR EQUAL  +-----------------------------------------------( )-----|
| |Source A      I:1.1 |                                                    103     |
| |                    |                                                            |
| |Source B        190 |                                                            |
| |                    |                                                            |
| +--------------------+                                                            |
```

Mapping Counter Outputs to Hardware Addresses

When the counter accumulated value reaches the preset value set by a machine operator, the counter sets a done bit (DN). You program it to implement a response suitable to your application. Your logic can initiate some logical function and/or activate an output device. If activating an output device, you can map the DN bit to to the output point of an output module in a slot location of your choice.
For example:

Counter DN bits:
- Counter 1 DN bit at **B47/0**
- Counter 2 DN bit at **B47/1**

Program the transfer of 2 counter DN bits



Your hardware (I/O image table) slot/point addresses
- output point for counter 1 for a designated
- output point for counter 2 slot location

Programming Counter Outputs

The use of your counter is application specific. If using it to activate an output device, your ladder logic could include rungs similar to the following example. We suggest that you program this in PF15.

Counter DN bits:	To hardware (I/O image) addresses:	
XIC (Source) Address:	Slot:	OTE (Destination) Address:
B46/102 (Counter 1 DN Bit)	10	O:10/0
B46/103 (Counter 2 DN Bit)		O:10/1

Important: Edit these instructions with the addresses of your I/O. Refer to hardware addresses that you wrote down on a Worksheet in chapter 5.

```
Rung 14:41
| Counter 1 DN |                                                        Output Device |
|    B47                                                                 O:10     |
|----] [-------------------------------------------------------------------( )-----|
|       0                                                                0     |

Rung 14:42
| Counter 2 DN |                                                        Output Device |
|    B47                                                                 O:10     |
|----] [-------------------------------------------------------------------( )-----|
|       1                                                                1     |
```

Setting Up a Password and Compensating for Press Speed

Objectives

This chapter describes two unrelated topics because you set them up in a similar manner with your programming terminal.

- Master Password (for maintaining authorized access)
  - What it is, and how to set it up
- Press speed compensation (for a variable-speed press)
  - What it is, and when to use it
  - How does it work?
  - How do you set it up?

Master Password: What It Is, and How to Set It Up

The master password is a 4-digit number that the software uses to match against whenever an operator "logs on" with a password.

The default (factory-set) master password is 1234. When setting up your control system, you may change it by entering your own 4-digit master password into N61:253 with your programming terminal.

Press-speed Compensation: What It Is, and When to Use It

Press-speed compensation is the optional automatic adjustment of the angular value from the resolver. The compensation algorithm adds an offset to the value so that the control system operates on *offset* angular values and responds *sooner* by the amount of the offset. The offset value reaches the setpoint before the actual value.

The algorithm produces an offset value proportional to press speed by the following equation:

$$\text{Offset} = \frac{Ax^2}{10{,}000} + \frac{Bx}{100} + \frac{C}{1}$$

where x = press speed

A, B, and C are constants that you enter into pre-assigned data table addresses with your programming terminal to obtain desired results.

When Do You Use it?

Typically, you use press-speed compensation:

- for a *variable-speed* press
- when PLS or DM functions occur *late* as press speed increases

How Does It Work?

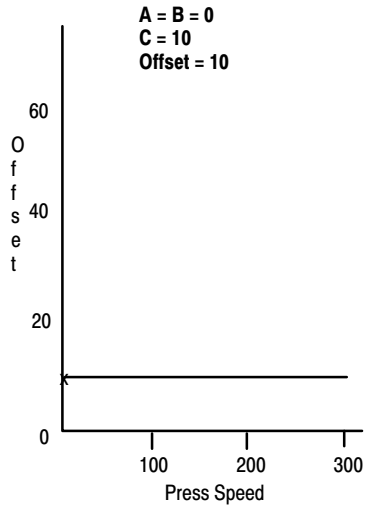
By your choice of constants (let unwanted ones be zero), you can make the offset:

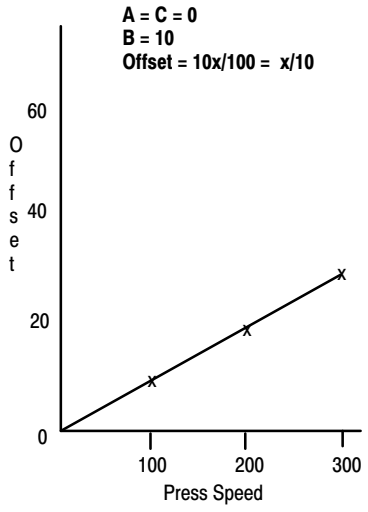
- a constant
- proportional to press speed (gets larger as press speed increases)
- exponentially proportional to press speed (gets larger faster)

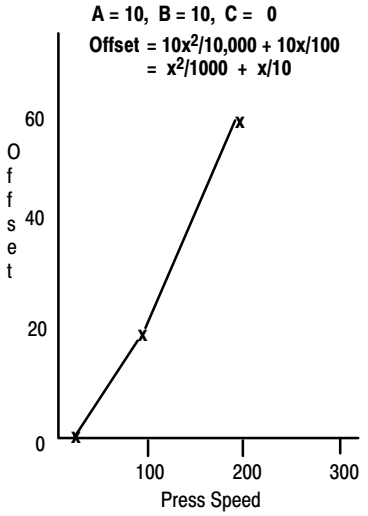
For this relationship:	Let:	Then Offset:
Offset = constant	A = B = 0	= C
Offset proportional to press speed	A = C = 0	= Bx/100
Offset exponentially proportional to speed	C = 0	= Ax^2 /10,000 + Bx/100

We suggest values of zero or whole numbers 1-10.

To illustrate these relationships, we graphed examples of offset vs press speed for different constant values.







How Do You Set It Up?

You set up the compensation algorithm by entering values for constants A, B, and C directly into pre-assigned areas of the data table reserved for them. Do this with your programming terminal. We give you separate compensation for DM and PLS resolver inputs:

Constant:	Address
A for DM	N45:37
B for DM	N45:36
C for DM	N45:35
A for PLS	N145:4
B for PLS	N145:3
C for PLS	N145:2

Compensation is disabled when all constants are cleared (zero value).

Customizing Your PanelView Screen Lists

Chapter Objectives

In this chapter, we show you how to change default names to those that suit your application. The names are found in these lists:

- part files 1-20 and channels 1-16
- spare setpoints 1-10

We also tell you how to copy screens from an existing application.

To change PanelView screens, you must use PanelBuilder software.

The procedures that we describe are condensed from those presented in the Getting Started Guide for PanelBuilder 500, publication 2711-804. Refer to that publication for additional information.

Changing the Names of Part Files and Channels

Use the procedure that follows with any of the following software products to change names to suit your application.

- PLS/DM software (cat. no. 6556-SPAKS)
- PLS (only) software (cat. no. 6556-SPLS)
- DM (only) software (cat. no. 6556-SDM)

The procedure is the same for any of these software products.

Important: If you have not already done so, load your software diskettes on your computer.

Important: We present the default list of part file and channel names so you can determine which ones suit your application. Use worksheets on the next page to customize the names to suit your application.

Worksheet G for Part File Names

File	Default Names	Your Custom Names
1	Unnamed	
2	Front Fender	
3	Rear Fender	
4	L Door	
5	R Door	
6	Hood	
7	RF Fender	
8	LF Fender	
9	Trunk	
10	RR Fender	
11	MSG 11	
12	MSG 12	
13	MSG 13	
14	MSG 14	
15	MSG 15	
16	MSG 16	
17	MSG 17	
18	MSG 18	
19	MSG 19	
20	MSG 20	

Worksheet H for DM Channel Names

Chnl	Default Names	Your Custom Names
0	Part Ejection	
1	Stock Thickness	
2	Short Feed	
3	Stock Lube	
4	ST 4	
5	ST 5	
6	ST 6	
7	ST 7	
8	ST 8	
9	ST 9	
10	ST 10	
11	ST 11	
12	ST 12	
13	ST 13	
14	ST 14	
15	ST 15	

Worksheet I for Names of Spare Setpoints

Spare:	Your Custom Names
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Procedure to Change Part-file and Channel Names

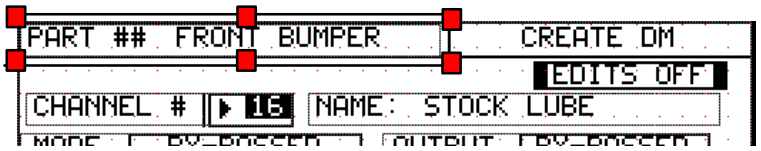
1. Open PanelBuilder.
2. Open the Application for PLS/DM, PLS, or DM.
   For example, PLS/DM software (cat. no. 6556-SPAKS) contains these files depending on whether you are using PanelView 550 or 900:

For PanelView 550:	For PanelView 900
die_550.pba	die_900.pba
die_550.pva	die_900.pva
*.pba files are complete ApplicationBuilder files that you can upload from PanelView	*.pva files are small files that you cannot upload once loaded into PanelView

3. When you open the Application, you get the Application file window. Select any *one* of the following screens:

For This Software:	Select Any -*One*- of the Following Screens:
PLS/DM and DM	Edit/Monitor DM or Create DM
PLS	Edit/Monitor PLS or Create PLS

4. Select (click on) the name of the part file.



   Consider changing all applicable part file names, then channel names.

5. On the menu bar, click on Edit and select Ungroup.
   (The software groups information to conserve memory.)
6. Click elsewhere on the screen to de-select the entire group of objects.
7. Click again on the name of the part file to select it.
8. On the menu bar, click on the Inner Text button.
   You get a dialog box displaying the name of the part file.
9. Change the name to suit your application.
10. On the menu bar, click on the State Box.
    You get a dialog box displaying the numbers of the default names.
11. Select the next number whose name you want to change.
12. Repeat steps 7-11 for all the part file names you want to change.
13. Re-group the part file names. To do this:
    a. Click on the part-file name box to select it.
    b. From the menu bar, click on Edit, select Regroup, and click on it.
14. Repeat steps 4-11 for all the *channel* names you want to change.
15. When you have changed all applicable names:
    From the menu bar, click on Edit and select Regroup.
16. Close the screen.
17. Save the Application file.

Changing the Names of Spare Setpoints

To change setpoint names from spares 1-10 to names that suit your application, repeat the procedure that follows for these two screens:

- Edit/Monitor Spares
- Create Spares

Procedure to Change Names of Spare Setpoints

1. Open PanelBuilder.
2. Open the Application for PLS/DM, PLS, or DM.
   For example, open die_900.pba for PLS/DM on PanelView 900.
3. Select the Edit/Monitor Spares screen.
4. Click on the name, Spare 1.
5. On the menu bar, click on the Inner Text button.
   You get a dialog box displaying the subject name.
6. Use the backspace-delete key to remove the default name.
   Enter the setpoint name that suits your application.
   (You cannot delete the **N** prefix. Append your name to it.
   For example, **N**tonnage.)
7. Click elsewhere on the screen.
8. Repeat steps 4-7 for each name you want change on that screen.
9. Go to the Create Spares screen.
10. Repeat steps 4-7. Make the names identical to the previous screen.
11. Close the screen.
12. Save the ApplicationBuilder file.

Adding Screens to the PanelView Program

If you want to add screens from an existing application to this PanelView program, you must add them to the PBA file contained in this software. Do this as follows:

1. Copy the screen from your existing application and paste it into the PBA file contained in this software.
2. Copy all screen tags of the subject screen into the PBA file, as well.

ATTENTION: Do Not change the numbers assigned to PanelView screens because the software controls screens by their assigned number.

Notes:

Using DM Screens

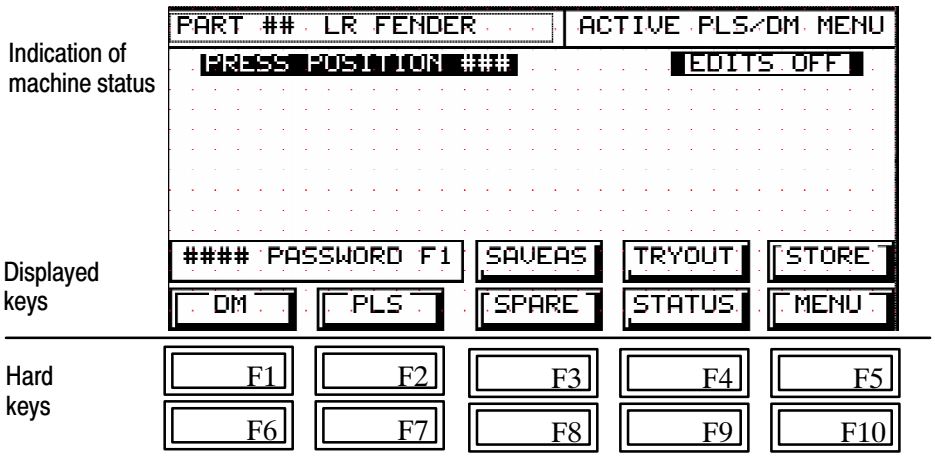
Objectives

This chapter presents the various screens for using DM. We cover:

- using typical features
- using Main Menu and Status screens
- using screens for an active job
- using screens to create a new part file

Using Typical Features

We illustrate some typical features with the Active Menu screen as displayed on a PanelView 550 terminal.



Using Function Keys

Notice the double row of keys displayed at the bottom of the screen. The upper row of *displayed* keys matches hard keys [F1] – [F5], and that the lower row of *displayed* keys matches hard keys [F6] – [F10]. To select another screen, press the hard key associated with the displayed key. For example, to select the SAVEAS screen, press [F3].

Entering Your Password

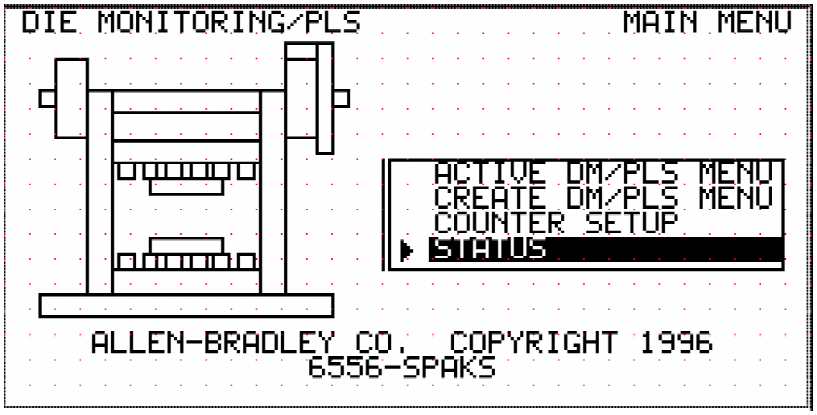
Before you can edit or create a part file, you must enter a valid 4-digit password. Do this by pressing the password key [F1] and entering the four numerals of your password on the numeric key pad followed by pressing the return arrow ⏎ .

Reading Machine Status

Information indicating machine status is displayed in reverse video. For example, PRESS POSITION ### shows crankshaft angular position.

Using Main Menu and Status Screens

The first screen displayed is the Main Menu screen.



Use ∧ ∨ arrow keys to select your next screen.

Then press enter ⏎

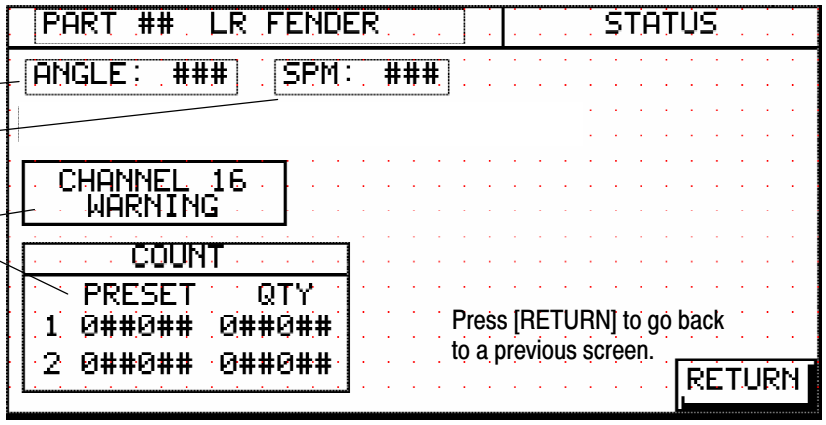
Starting with the main menu, use ∧ ∨ arrow keys to select what to do next. Then press the return arrow key.

To Do This:	Select:
Monitor or edit the part file that is currently active on the machine	Active Menu
Create a new part file for a job you will use in the future	Create Menu
Set up your counters	Counter Setup
View machine status	Status

When you select STATUS, the system presents the Status screen:

After mapping your software as described in chapters 8 and 9, this screen will show:
- Continuous crankshaft angle
- Press speed in strokes per minute

This screen shows:
- Fault message detected for a channel
- Counter preset and accumulated values



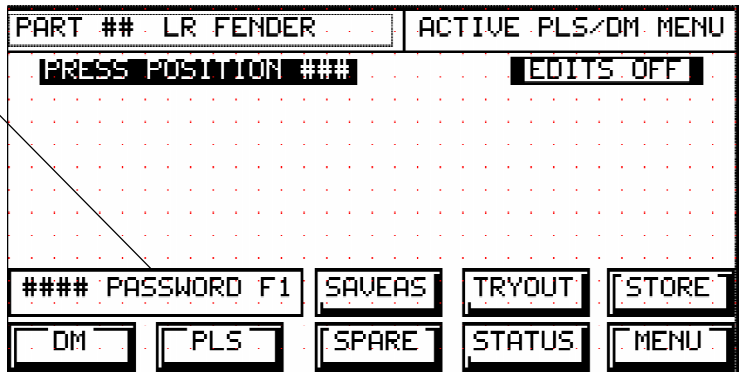
Using Screens for an Active Job

To access screens of an existing part file that controls an *active job,* select ACTIVE MENU. You also use this screen to save-as or store all setpoints for the active job.

When you select ACTIVE MENU from the Main Menu screen, you get:

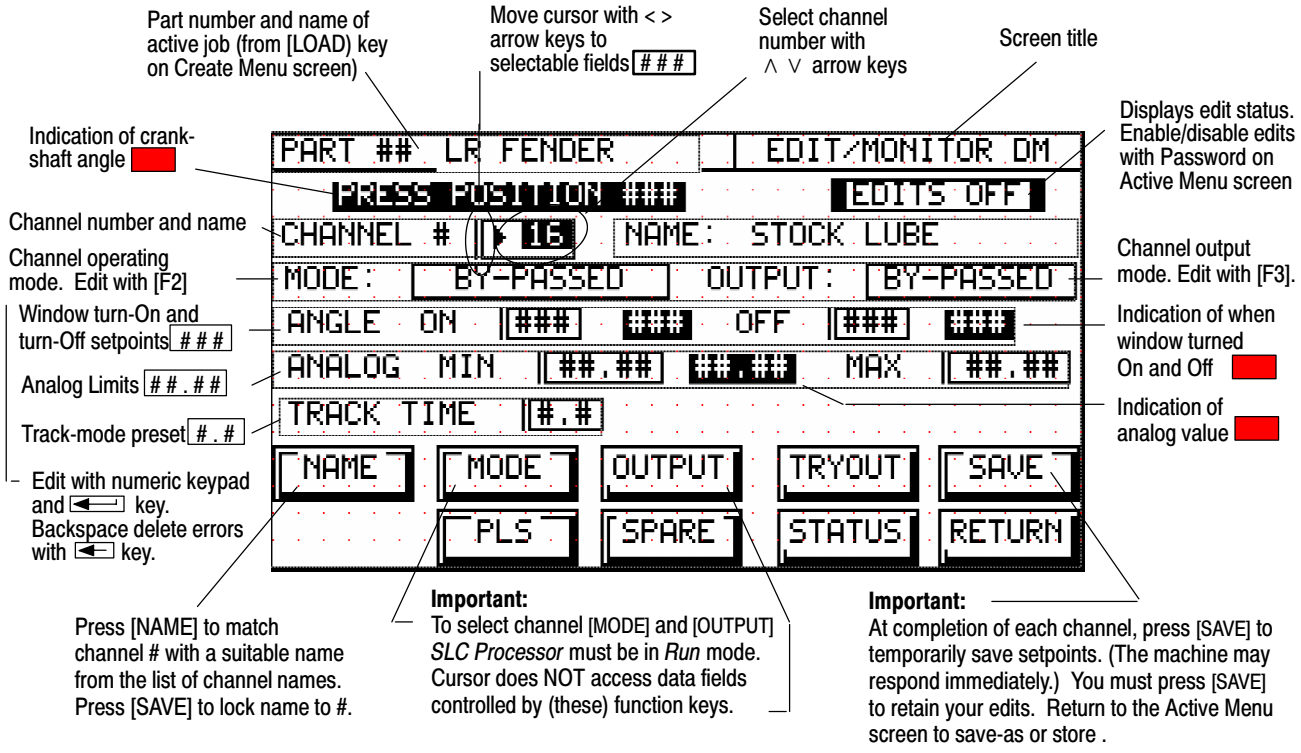
To:	Press:
Enable edits with password Disable edits with password	[F1] + pw + ⏎ [F1] + ⏎
Edit/monitor DM setpoints for an active job.	[DM]
Save the active job with a new part file number	[SAVEAS]
Store changes to the part file you are currently in	[STORE]
Select another screen	Other Keys

[PLS] and [TRYOUT] are covered in chapter 14.

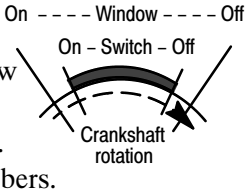


In order to edit setpoints on a screen, you must first enter your password as described in the table above.

To monitor DM operation and/or edit DM setpoints, press [DM]. You get the Edit/Monitor DM screen.


Part number and name of active job (from [LOAD) key on Create Menu screen)
Move cursor with < > arrow keys to selectable fields ###
Select channel number with ∧ ∨ arrow keys
Screen title
Displays edit status. Enable/disable edits with Password on Active Menu screen
Indication of crank-shaft angle
Channel number and name
Channel operating mode. Edit with [F2]
Window turn-On and turn-Off setpoints ###
Analog Limits ##.##
Track-mode preset #.#
Edit with numeric keypad and ⏎ key. Backspace delete errors with ← key.
Channel output mode. Edit with [F3].
Indication of when window turned On and Off
Indication of analog value
PART ## LR FENDER
EDIT/MONITOR DM
PRESS POSITION ###
EDITS OFF
CHANNEL # 16
NAME: STOCK LUBE
MODE: BY-PASSED
OUTPUT: BY-PASSED
ANGLE ON ### ### OFF ### ###
ANALOG MIN ##.## ##.## MAX ##.##
TRACK TIME #.#
NAME
MODE
OUTPUT
TRYOUT
SAVE
PLS
SPARE
STATUS
RETURN
Press [NAME] to match channel # with a suitable name from the list of channel names. Press [SAVE] to lock name to #.
Important:
To select channel [MODE] and [OUTPUT] SLC Processor must be in Run mode. Cursor does NOT access data fields controlled by (these) function keys.
Important:
At completion of each channel, press [SAVE] to temporarily save setpoints. (The machine may respond immediately.) You must press [SAVE] to retain your edits. Return to the Active Menu screen to save-as or store .

When editing DM setpoints, remember that:



- For CYC, POS, and SGP modes, the window defines the zone of rotation within which or outside of which the input must be detected.
  Enter ANGLE ON/OFF angles in whole numbers.
  Read *displayed* ANGLE ON/OFF values to help set up windows. They tell you when the *channel's input switch* turned On and Off.
- For TRK mode, enter timer preset (seconds) in TRACK TIME field. Use track mode with PLS by giving the same channel number to both.
- For XFR mode, assign the entry station input to B46/105 or to a channel with bypassed output. Either must precede the first transfer-mode channel.
- For ALG mode, enter window ON/OFF angles.

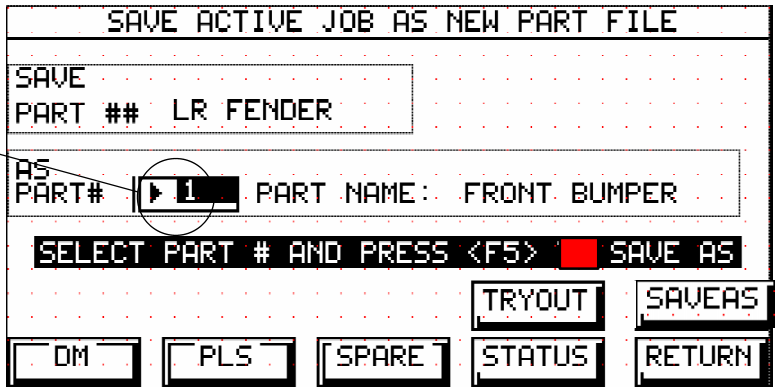
Important: At completion of each *channel*, press [SAVE] to *temporarily* save setpoints. When you do, *the machine may respond immediately.* You must press [SAVE] before you can exit the screen.

Then, return to the Active Menu screen to store or save-as.

- To save your edits in the same part file, press [STORE].
  The software updates the part file in the file management area.
- To copy the active part file to a new "save as" part file, press [SAVEAS]. You get the Save Active Job As New Part File screen.

When you press [SAVEAS], you get this screen.

To:	Press:
Select the new part name and number from the prepared list (chapter 12)	∧ ∨ arrow keys to select the new part #
Save changes, stored in the new "saveas" part file	[SAVEAS]
Select another screen	Other Keys



We differentiate among three similar terms for saving data.
For saving data associated with an *active* machine:

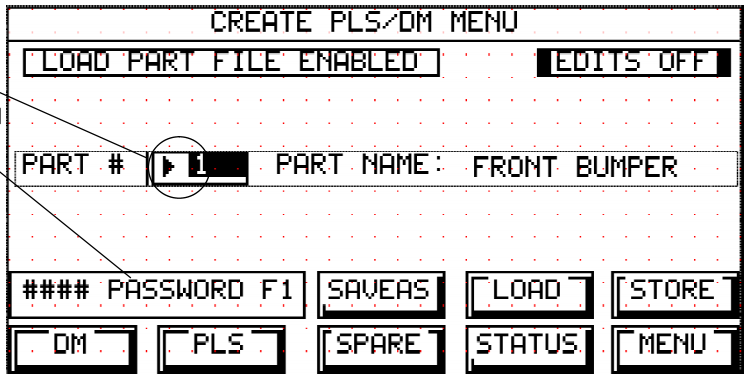
To:	Press:
Activate edited setpoints **Important:** The machine may respond immediately.	Save
Copy the part file, under a new name and number, into the file management area **Important:** The copy-from part file is retained.	Save As
Return the current part file to storage in the file management area	Store

Using Screens to Create a New Part File

To access screens to create a new part file for a job not running on the machine, select CREATE MENU from the Main Menu screen.

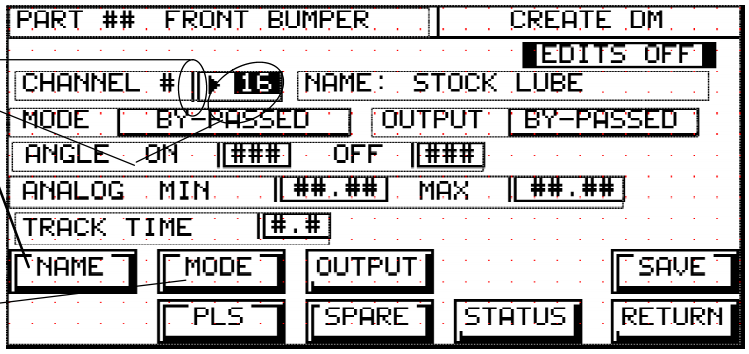
Before you can create a new part file, you must enter a valid password. When you do, the EDITS OFF prompt changes to EDITS ON.

To:	Press:
Select part file # and name from list (chapter 12)	∧ ∨ arrow keys
Enable edits with password	[F1] + pw + ⏎
Disable edits with password	[F1] + ⏎
Create a DM part file	[DM]
Save current part file with a new # and name	[SAVEAS]
Download the part file to the SLC processor	[LOAD]
Store changes to the part file you are currently in	[STORE]



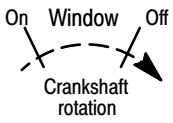
To create a DM part file, press [DM]. You get the Create DM screen.

To Select or Edit:	Press:
Cursor position |	< > arrow keys
New channel #	∧ ∨ arrow keys
New channel name	[NAME]
Window On & Off angles	numeric keypad and press ⏎
Analog min/max limits	
Track-mode turn Off time	backspace delete errors with ⏎
Channel Mode & Output *(Processor in Run Mode)*	[MODE] and [OUTPUT] keys



When setting up a DM channel, remember these points:

- Move cursor with < > arrow keys.
- Select the channel number and name.
- For CYC, POS, and SGP modes, the window defines the zone of rotation within which or outside of which the input must be detected. Enter ANGLE ON/OFF angles in whole numbers.



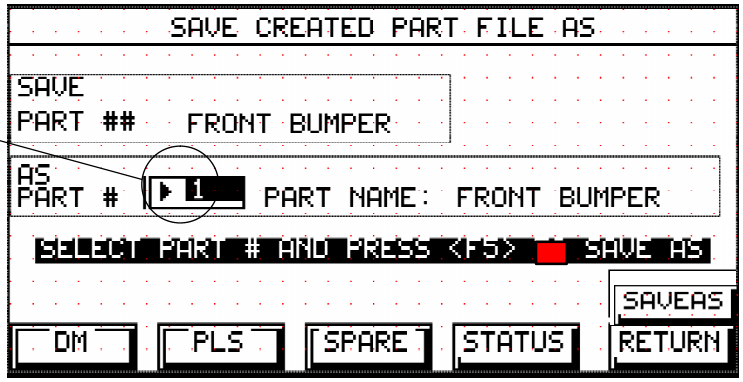
- For TRK mode, enter timer preset (seconds) in TRACK TIME field. Use track mode with PLS by giving the same channel number to both.
- For XFR mode, assign the "upstream" input to B46/105, or to a channel with bypassed output and that precedes the first transfer-mode channel.
- For ALG mode, enter ANGLE ON/OFF angles.

Important: At completion of each *channel*, press [SAVE] to *temporarily* save setpoints. When you have completed all channels, you must return to Create Menu screen to store the completed part file.

To store, copy, or download your current part file, return to the Create Menu screen (shown on previous page).

- To download the part file to active memory, press [LOAD].
  This will overwrite the existing active job.
  Download bit (B46/107) must be set to allow the download.
  See below for more information on downloading a part file.
- To save your current file, press [STORE].
  The software stores the file with the same job number and name in the file management area.
- To copy the current file to a new "save as" file, press [SAVEAS].
  You get the Save Created Part File As screen.

To:	Press:
Select the new part name and number from the prepared list (chapter 12)	∧ ∨ arrow keys to select the new part #
Copy the file to a new "saveas" name & number	[SAVEAS]
Select another screen	Other Keys



We differentiate among three similar terms for saving data.
For saving data associated with *creating* a new part file:

To:	Press:
Temporarily save the data of one screen until you store the part file from the Create Menu. **Important:** If you omit storing it from the Create Menu, the part file is *erased* when you store some other part file, later.	Save
Copy the part file, under a new name and number, into the file management area. **Important:** The copy-from part file is retained.	Save As
Return the current part file to storage in the file management area.	Store

Downloading a Part File

To set up and run a new part, download the new part file as follows:

1. Go to the *Create* Menu.
2. Select the part file number with ∧ ∨ arrow keys.
3. The prompt LOAD PART FILE DISABLED tells you to set B46/107.
4. Press [LOAD].
5. Verify the new part file #/name on an EDIT/MONITOR screen.

If the part file is undefined (no setpoints), active memory is cleared.

Using PLS Screens

Objectives

This chapter presents the various screens for using PLS. We cover:

- using typical features
- using Main Menu and Status screens
- using screens for an active job
- using screens to create a part file

The screens let you select PLS or DM functions.
We cover PLS in this chapter, DM in the previous chapter.

Using Typical Features

Refer to the same heading at the beginning of chapter 13 for:

- using function keys
- entering your password
- reading machine status

Using Main Menu and Status Screens

Refer to the same heading at the beginning of chapter 13 for:

- using up/down arrow keys on Main Menu to select what to do next
- reading the Status screen

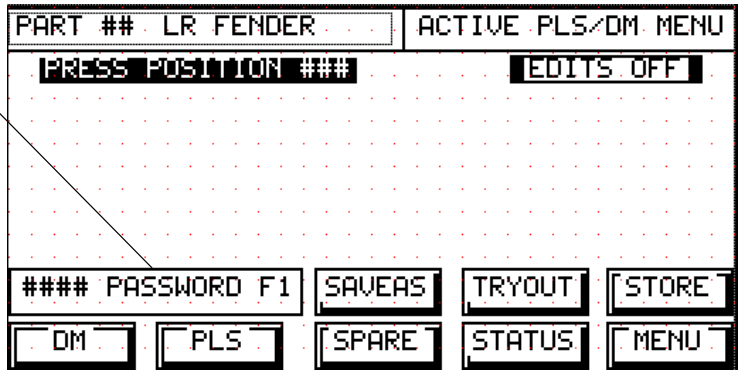
Using Screens for an Active Job

To access screens of an existing part file that controls an *active job*, select ACTIVE MENU. You also use this screen to save-as or store all setpoints for the active job.

When you select ACTIVE MENU from the Main Menu screen, you get:

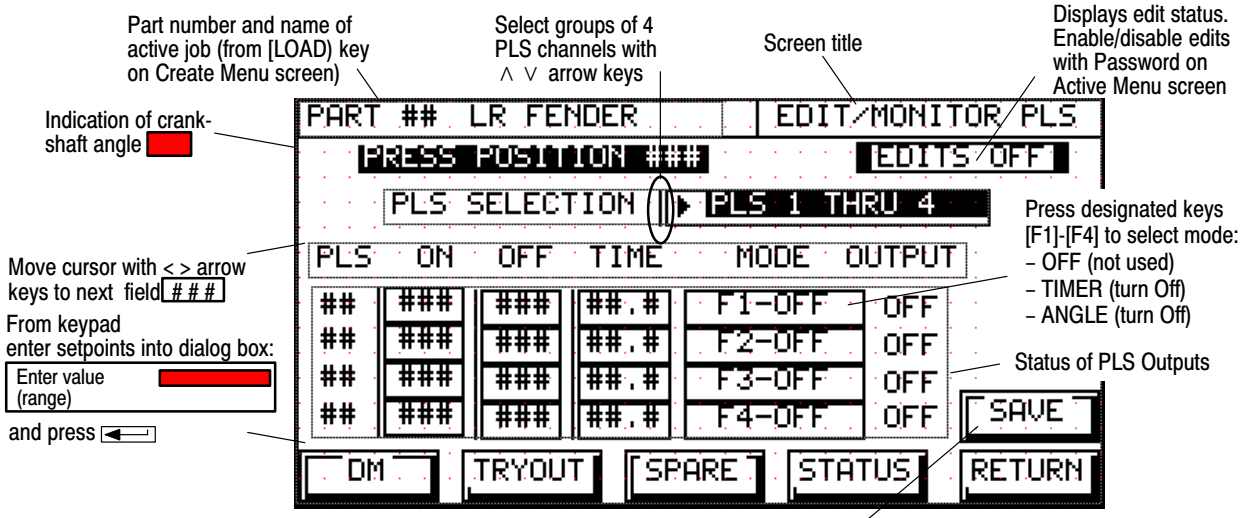
To:	Press:
Enable edits with password Disable edits with password	[F1] + pw + ↵ [F1] + ↵
Edit/monitor PLS setpoints for an active job.	[PLS]
Turn PLS outputs On/Off	[TRYOUT]
Save an active job with a new part file number	[SAVEAS]
Store changes to the part file you are currently in	[STORE]
Select another screen	Other Keys

[DM] is covered in chapter 13.



In order to edit setpoints on a screen, you must first enter your password as described in the table above.

To monitor PLS operation and/or edit PLS outputs, press [PLS]. You get the Edit/Monitor PLS screen.


Part number and name of active job (from [LOAD] key on Create Menu screen)
Select groups of 4 PLS channels with ∧ ∨ arrow keys
Screen title
Displays edit status. Enable/disable edits with Password on Active Menu screen
Indication of crank-shaft angle
PART ## LR FENDER
EDIT/MONITOR PLS
PRESS POSITION ###
EDITS OFF
PLS SELECTION
PLS 1 THRU 4
Press designated keys [F1]-[F4] to select mode:
– OFF (not used)
– TIMER (turn Off)
– ANGLE (turn Off)
Move cursor with < > arrow keys to next field ###
PLS ON OFF TIME MODE OUTPUT
##.# F1-OFF OFF
##.# F2-OFF OFF
##.# F3-OFF OFF
##.# F4-OFF OFF
From keypad enter setpoints into dialog box:
Enter value (range)
and press ↵
Status of PLS Outputs
SAVE
DM
TRYOUT
SPARE
STATUS
RETURN

Important: At completion of each set of 4 PLS channels, press [SAVE] to temporarily save setpoints. (The machine may respond immediately.) You must press [SAVE] before you can exit this screen. Return to the Active Menu screen to save-as or store.

When editing PLS outputs, remember these points:

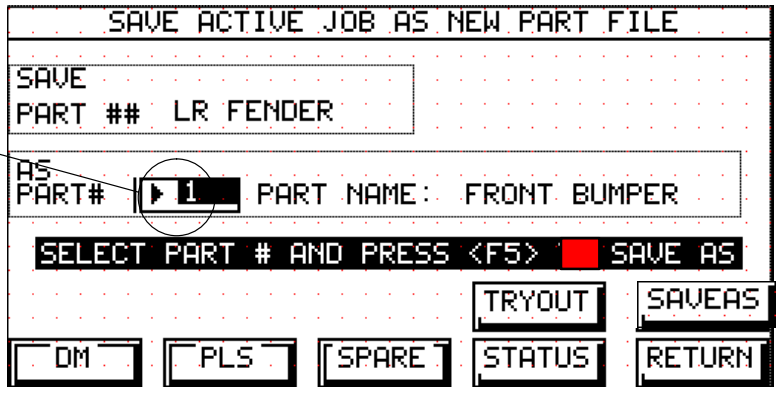
- Always turn On a PLS output with an angular position
- Turn Off a PLS output with an angular position or a preset time
- When using PLS with track mode, give both channels the same number

Procedure to Edit PLS Setpoints

1. Move cursor with < > arrow keys to PLS SELECTION.
2. Select group of four PLS channels with ∧ ∨ × arrow keys.
3. Move cursor to PLS channel with < > arrow keys.
4. Edit/enter PLS ON angle and OFF time or angle with keypad into the displayed dialog box. Press return arrow to insert.

5. Correct entry errors in dialog box with backspace-delete arrow.
6. Complete PLS channels in groups of four.
7. **Important:** At completion of each set of four PLS channels, press [SAVE] to *temporarily* save setpoints. When you do, *the machine may respond immediately.* You must press [SAVE] before you can exit the screen.
8. Return to the Active Menu screen to store or save-as.
   - To save your edits in the same part file, press [STORE]. The software updates the part file in the file management area.
   - To copy the active part file to a new part file, press [SAVEAS]. When you press [SAVEAS], you get this screen.

To:	Press:
Select the new part name and number from the prepared list (chapter 12)	∧ ∨ arrow keys to select the new part #
Save changes, stored in the new “saveas” part file	[SAVEAS]
Select another screen	Other Keys

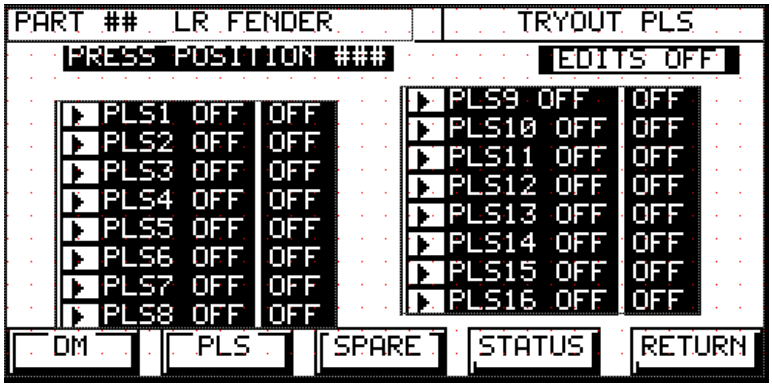


We differentiate among three similar terms for saving data. For saving data associated with an *active* machine:

To:	Press:
Activate edited setpoints **Important:** The machine may respond immediately.	Save
Copy the part file, under a new name and number, into the file management area **Important:** The copy-from part file is retained.	Save As
Return the current part file to storage in the file management area	Store

To tryout PLS output channels with the machine running, go to the PLS tryout screen by pressing [TRYOUT]. You get this screen:

To:	Press:
Select a PLS channel	< > arrow keys
Turn a channel On/Off (see **ATTENTION**)	∧ ∨ × arrow keys plus ↵
Return to PLS screen to edit setpoints	[PLS]
Select another screen	other keys



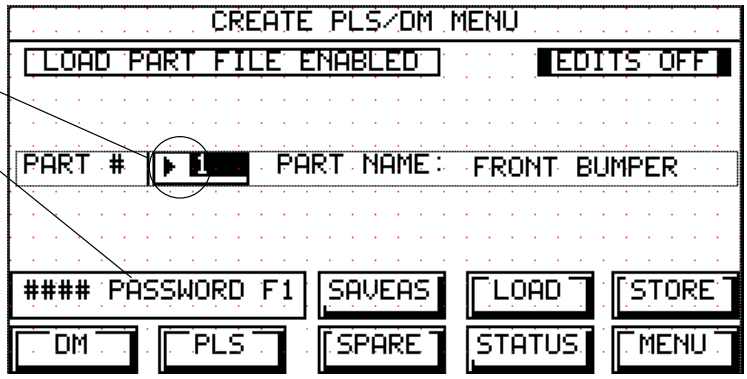
ATTENTION: When you press the return arrow when turning a PLS channel On or Off, the output may activate immediately.

Using Screens to Create a New Part File

To access screens to create a new part file for a job not running on the machine, select CREATE MENU from the Main Menu screen.

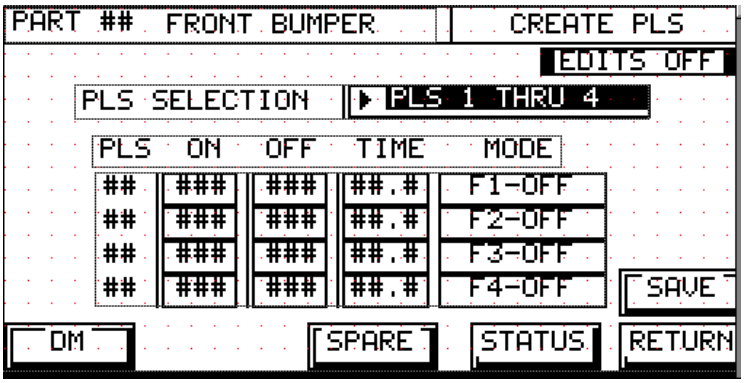
Before you can create a new part file, you must enter a valid password. When you do, the EDITS OFF prompt changes to EDITS ON.

To:	Press:
Select part file # and name from list (chapter 12)	∧ ∨ arrow keys
Enable edits with password	[F1] + pw + ↵
Disable edits with password	[F1] + ↵
Create a DM part file	[DM]
Save current part file with a new # and name	[SAVEAS]
Download the part file to the SLC processor	[LOAD]
Store changes to the part file you are currently in	[STORE]
Select another screen	Other keys



To create a PLS part file, press [PLS]. You get the Create PLS screen.

To Select/Edit:	Press:
Cursor position |	< > arrow keys
Groups of 4 PLS channels (cursor on PLS SELECT)	∧ ∨ arrow keys
PLS ON angles (cursor to)	numeric keypad and ↵
PLS OFF angle or time	
Data entry error	backspace delete with ↵
Another screen	Other keys



When setting up PLS outputs, remember these points:

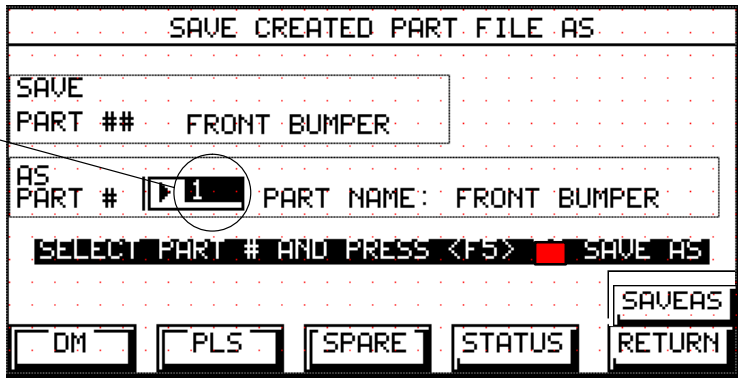
- Select PLS channels as per Procedure to Edit PLS Setpoints, above.
- Always turn On a PLS output with an angular position.
- Turn Off a PLS output with an angular position or a preset time.
- When using PLS with track mode, give both channels the same number.

Important: At completion of each set of four PLS channels, press [SAVE] to *temporarily* save setpoints. When you have completed all PLS channels, you must return to Create Menu screen to store, copy, or download the completed part file.

Now you can store, copy, or download your completed part file from the Create Menu screen (shown on previous page):

- To download the part file to active memory, press [LOAD].
  This will overwrite the existing active job.
  Download bit (B46/107) must be set to allow the download.
  For more information, refer to Downloading on next page.
- To save your current file, press [STORE].
  The software stores the file with the same job number and name in the file management area.
- To copy the current file to a new "save as" file, press [SAVEAS].
  You get the Save Created Part File As screen.

To:	Press:
Select the new part name and number from the prepared list (chapter 12)	∧ ∨ arrow keys to select the new part #
Copy the file to a new "saveas" name & number	[SAVEAS]
Select another screen	Other Keys



We differentiate among three similar terms for saving data.
For saving screens associated with *creating* a new part file:

To:	Press:
Temporarily save the data of one screen until you store the part file from the Create Menu. **Important:** If you omit storing it from the Create Menu, the part file is *erased* when you store some other part file, later.	Save
Copy the part file, under a new name and number, into the file management area. **Important:** The copy-from part file is retained.	Save As
Return the current part file to storage in the file management area.	Store

Downloading a Part File

To set up and run a new part, download the new part file as follows:

1. Go to the *Create* Menu.
2. Select the part file number with ∧ ∨ arrow keys.
3. The prompt LOAD PART FILE DISABLED tells you to set B46/107.
4. Press [LOAD].
5. Verify the new part file #/name on an EDIT/MONITOR screen.

If the part file is undefined (no setpoints), active memory is cleared.

Using Screens for Counters and Spare Setpoints

Objectives

This chapter presents the screens for using counters 1 and 2, and for entering setpoints for some optional spare function. We cover:

- using main menu and status screens
- setting up counters 1 and 2
- entering spare setpoints with an active job
- creating spare setpoints in a new part file

Using Main Menu and Status Screens

Refer to the same heading at the beginning of chapter 13 for:

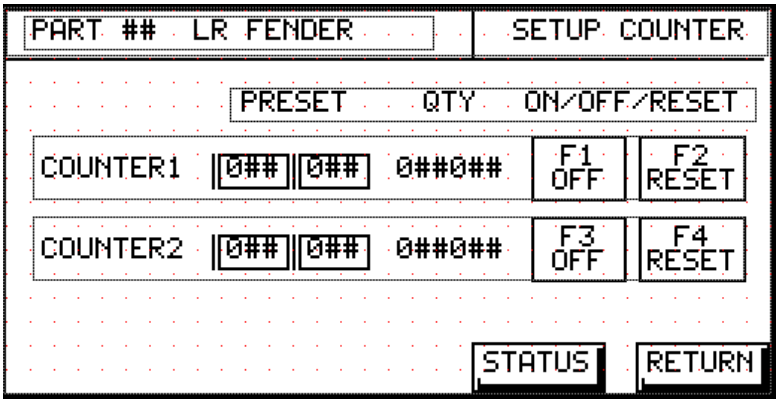
- using up/down arrow keys on Main Menu to select what to do next
- reading the Status screen

Setting Up Counters 1 and 2

Counters are active provided you wired their input switches and programmed the transfer of counter inputs into the data table. You do not need a password to set them up.

To get the screen to set up the counters, press [COUNTER SETUP] from the main menu. You get this screen:

To:	Press:
Move the cursor	< > arrow keys
Enter a preset (Cursor to it, first.)	numeric keypad and press ↵
Turn a counter On/Off	[F1] or [F3]
Reset the counter	[F2] or [F4]
Select another screen	other keys



The screen title tells you the name and number of the current active job.

Important: The indicated count depends on when the operator reset the counter. The count could indicate total strokes on the machine, strokes for the active job, strokes for the day or night shift, etc.

Count information is *not* stored with the indicated job part file.

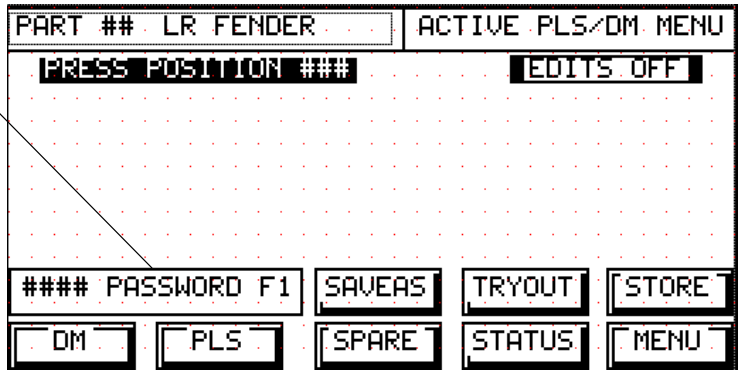
Entering Spare Setpoints For an Active Job

To access screens of an existing part file that controls an *active job*, select ACTIVE MENU. You also use this screen to save-as or store all setpoints for the active job.

When you select ACTIVE MENU from the Main Menu screen, you get:

To:	Press:
Enable edits with password Disable edits with password	[F1] + pw + ↵ [F1] + ↵
Edit/monitor spare setpoints for the active job.	[SPARE]
Save the active job with a new part file number	[SAVEAS]
Store changes to the part file you are currently in	[STORE]
Select another screen	Other Keys

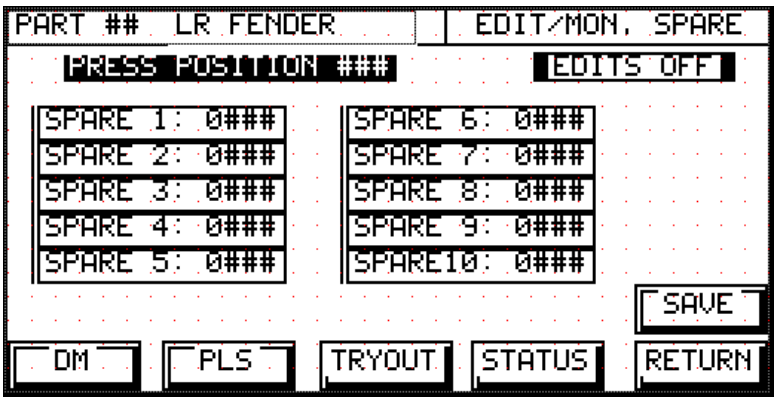
[PLS] and [TRYOUT] are covered in chapter 14.



In order to edit setpoints on a screen, you must first enter your password as described in the table above.

To monitor and/or edit spare setpoints, press [SPARE]. You get the Edit/Monitor SPARE screen.

To:	Press:
Move the cursor	< > arrow keys
Enter a setpoint	numeric keypad and press ↵
Correct an entry error	backspace delete with ←
Select another screen	Other keys



The spare screen lets you enter up to 10 setpoints that your application can use for:

- counterbalance
- stroke counts
- feed lengths

When you enter setpoints, the software automatically loads them into data table locations. To be used, your ladder logic must either:

- move them into hardware destination addresses for analog devices
- access them in their data table locations

For convenience, use the following table to define your setpoints. We provide the setpoint data table address. You may write down what the setpoint represents and your destination addresses or ladder logic comments.

Setpoint:	Represents:	At address:	For your destination address or comment:
Spare 1		N61:241	
Spare 2		N61:242	
Spare 3		N61:243	
Spare 4		N61:244	
Spare 5		N61:245	
Spare 6		N61:246	
Spare 7		N61:247	
Spare 8		N61:248	
Spare 9		N61:249	
Spare 10		N61:250	

For the procedure to change the names of setpoints from spare to names suitable to your application, refer to chapter 12.

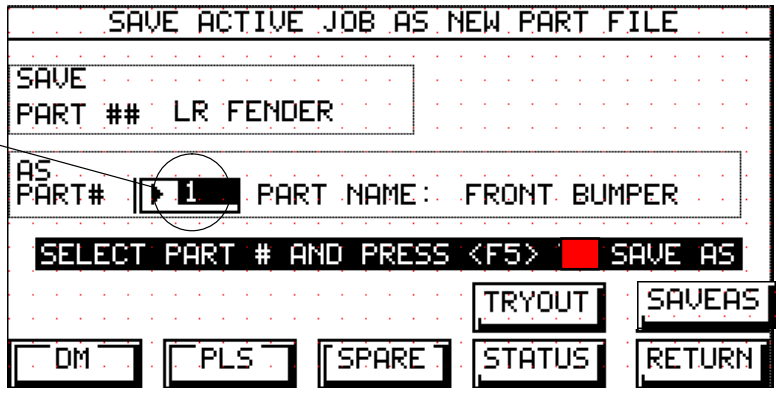
Program your setpoint ladder logic in a program file of your choice.

Important: When editing setpoints for an active job, they are are activated immediately when you press [SAVE]. (The machine may respond immediately.) Save desired edits before exiting the screen. If you decide not to keep your edits, exit the screen without saving.

To store your edits or to copy the active part file to a new “save as” file, return to the Active Menu screen (shown on previous page).

- To save your edits in the same part file, press [STORE]. The software updates the part file in the file management area.
- To copy the active part file to a new “save as” part file, press [SAVEAS]. You get the Save Active Job As New Part File screen.

To:	Press:
Select the new part name and number from the prepared list (chapter 12)	∧ ∨ arrow keys to select the new part #
Save changes, stored in the new “saveas” part file	[SAVEAS]
Select another screen	Other Keys

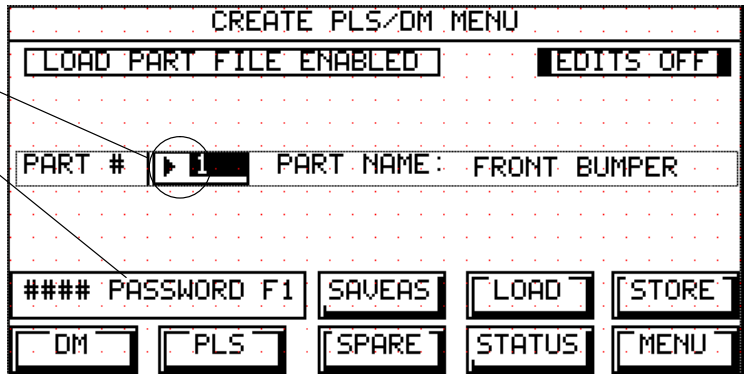


Creating Spare Setpoints in a New Part File

To access screens to create a new part file for a job not running on the machine, select CREATE MENU from the Main Menu screen.

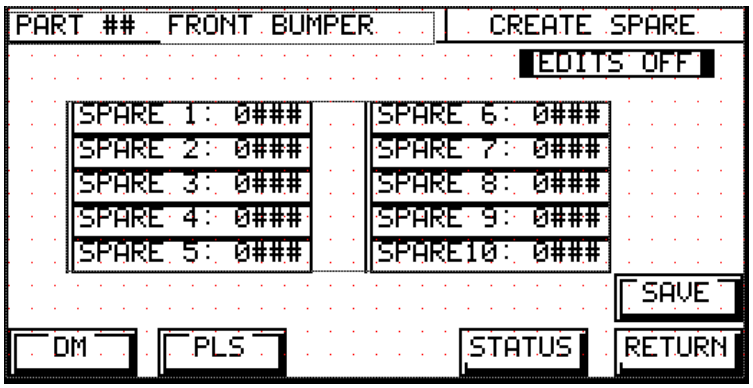
Before you can create a new part file, you must enter a valid password. When you do, the Edits Off prompt changes to Edits On.

To:	Press:
Select part file # and name from list (chapter 12)	∧ ∨ arrow keys
Enable edits with password Disable edits with password	[F1] + pw + ↵ [F1] + ↵
Create spares in a part file	[SPARE]
Save current part file with a new # and name	[SAVEAS]
Download the part file to the SLC processor	[LOAD]
Store changes to the part file you are currently in	[STORE]
Select another screen	Other keys



To create spare setpoints in a part file, press [SPARE]. You get the Create SPARE screen.

To:	Press:
Move the cursor	< > arrow keys
Enter a setpoint	numeric keypad and press ↵
Correct an entry error	backspace delete with ←
Select another screen	Other keys



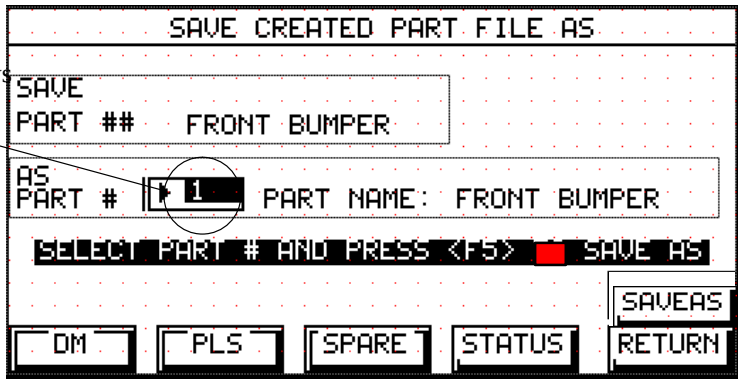
When you enter setpoints, the software automatically loads them into the data table when you press [SAVE]. To be used, your ladder logic must either move them into hardware destination addresses or access them in the data table.

To define your setpoints, use in the table in the previous section.

To store, copy, or download your current part file, return to the Create Menu screen (shown on previous page).

- To download the part file to active memory, press [LOAD].
  This will overwrite the existing active job.
  Download bit (B46/107) must be set to allow the download.
  For more information, refer to Downloading a Part File, below.
- To save your current file, press [STORE].
  The software stores the file with the same job number and name in the file management area.
- To copy the current file to a new "save as" file, press [SAVEAS].
  You get the Save Created Part File As screen.

To:	Press:
Select the new part name and number from the prepared list (chapter 12)	∧ ∨ arrow keys to select the new part #
Copy the file to a new "saveas" name & number	[SAVEAS]
Select another screen	Other Keys



We differentiate among three similar terms for saving data.
For saving data associated with *creating* a new part file:

To:	Press:
Temporarily save the data of a screen until you store the part file from the Create Menu. **Important:** If you omit storing it from the Create Menu, the part file is *erased* when you store some other part file, later.	Save
Copy the part file, under a new name and number, into the file management area. **Important:** The copy-from part file is retained.	Save As
Return the current part file to storage in the file management area.	Store

Downloading a Part File

To set up and run a new part, download the new part file as follows:

1. Go to the *Create* Menu.
2. Select the part file number with ∧ ∨ arrow keys.
3. The prompt LOAD PART FILE DISABLED tells you to set B46/107.
4. Press [LOAD].
5. Verify the new part file #/name on an EDIT/MONITOR screen.

If the part file is undefined (no setpoints), active memory is cleared.

Notes:

Testing DM and PLS Channels

Objectives

This chapter suggests how to check out your system by testing:

- DM channels
- PLS channels
- resolver input
- track mode (if used)
- transfer mode (if used)

We placed this chapter *after* the chapters that describe how to use PanelView screens because you must use the screens to test your DM and PLS channels.

Important: To check out your system, your SLC processor must be programmed and running in Run mode.

Testing DM Channels

In this procedure, you test one channel at a time to verify:

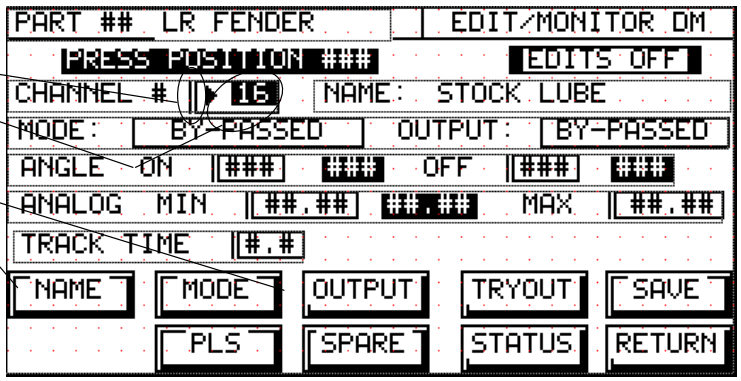
- signal thru-put is correct from the input switch into the data table
- that the software detects and indicates a channel fault
- that the software and wiring are set up to reset a fault

You will use the Edit/Monitor DM screen (Active mode) to enter information, and the Status screen to observe fault prompts.

Observe or set up the following initial conditions before starting, regardless of how you intend to use each channel later.

- all DM channels are set for by-pass mode (observed on the Edit/Monitor DM screen)
- all DM channel outputs are set for by-pass mode (observed on the Edit/Monitor DM screen)
- the fault prompt states “Channels 1-16 Cleared” (observed on the Status screen)

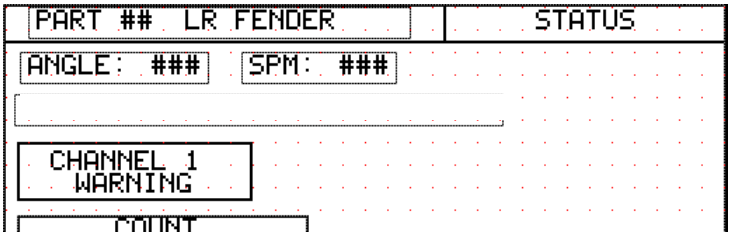
To Select or Edit:	Press:
Cursor position |	< > arrow keys
New channel #	∧ ∨ × arrow keys
New channel name	[NAME]
Channel Mode & Output *(Processor in Run Mode)*	[MODE] and [OUTPUT] keys



Procedure for Testing DM Channels

Start with channel 1.

1. Close the input switch.
2. From the Edit/Monitor screen, select
   – channel mode = static
   – channel output = warning
3. Go to the Status screen.
4. Open the input switch.
5. Observe the fault prompt “Channel 1 Warning”.



   If you do not see a warning on the Status screen, check for errors in:

   - input switch wiring (chapter 5)
   - your ladder logic to move input data from the hardware address for channel 1 into the pre-assigned data table address (chapter 8)

6. Close the input switch.
7. Press the fault reset pushbutton (sets control bit B46/101).
8. Observe that the fault prompt returns to “Channels 1-16 Cleared”.

Important: Repeat this procedure for each DM channel that you have wired into your system.

Testing PLS Channels

In this procedure, you test one channel at a time to verify signal thru-put from the data table to the output module (or output device).

You will use the PLS Tryout screen (Active mode) to turn On each channel, and observe the channel LED indicator to verify that the output turned ON. (You may also observe the output device that you wired to the output terminal for each channel.)

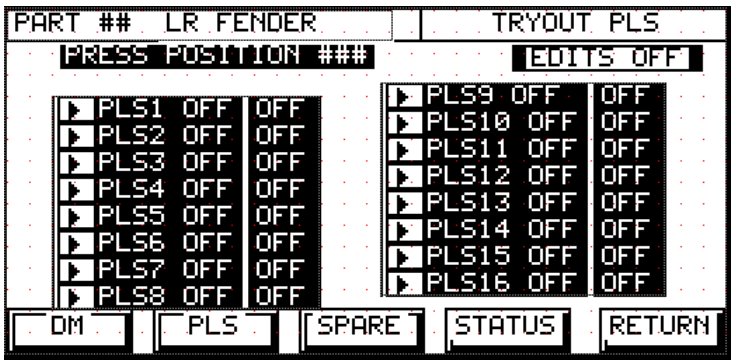
Observe or set up the following initial conditions before starting.

- all PLS channel setpoints are cleared (Edit/Monitor PLS screen)
- all PLS channels are OFF (PLS Tryout screen)

Procedure for Testing PLS Channels

To:	Press:
Select the PLS channel	< > arrow keys
Turn a channel On/Off (see **ATTENTION**)	∧ ∨ arrow keys plus ↵
Select another screen	other keys

1. From the PLS Tryout screen, cursor to PLS channel 1.



2. Turn on PLS channel 1 with an up/down arrow key, plus return key.
   ATTENTION: The PLS output may turn on immediately.
3. At the output module, observe that the LED indicator for PLS channel 1 turned on (or that the output device turned on).

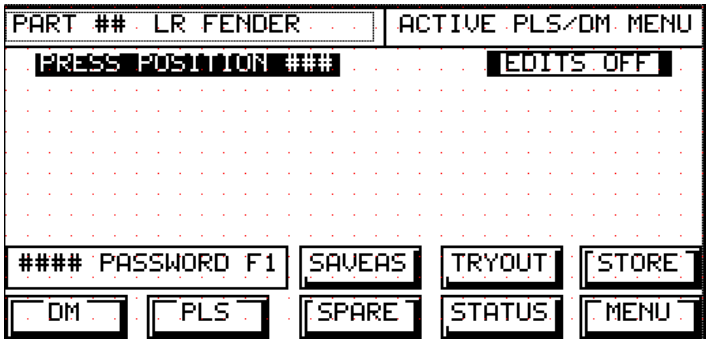
   If the output LED for the channel did not turn on (or the output device did not turn on), check for errors in:

   - your ladder logic to move output data from the the pre-assigned data table address to the hardware address (chapter 9)
   - wiring of your output device (chapter 5)
4. Turn off the PLS channel with an up/down arrow key plus return key.
5. Cursor to the next channel and repeat steps 1-4 until you have tested all PLS channels wired into your system.

Testing the Resolver Input

In this procedure, you observe that the angular position of the crankshaft (reported on one of several “active” screens) matches the observed die position of the stamping press.

1. Jog the press through one stroke.
2. On a screen such as the Active PLS/DM Menu, observe that the reported Press Position matches the position of the crankshaft.



If the press position is not reported, refer to the manufacturer's troubleshooting information for your resolver and resolver input module. Also check for errors in:

- resolver input wiring (chapter 5)
- your ladder logic to move resolver data from the hardware address into the pre-assigned data table address (chapter 9)

If the reported press position shows rotation in a direction opposite to the crankshaft, reverse the resolver input wires.

Testing a Transfer-mode Channel

In this procedure, you test the series of channels that you assigned to transfer mode to verify that you have:

- set up the channels correctly
- wired and programmed the "resume operation" pushbutton correctly

Before you begin, be sure that:

- **Important:** you tested all your DM channels as described above to verify DM channel mapping and wiring
- the entry station is set up correctly.

  You have a choice of two entry stations to a XFR-mode sequence: a channel with a bypassed output or a 1st-input bit.

  If using a channel with a bypassed output as the entry station:
  – its channel number is the first in the series of XFR-mode channels
  – its output mode is set to "by-passed"
  – its window is set correctly
  (A part must be in position throughout the window.)
  If using the 1st-input bit as the entry station:
  – you programmed its input switch to B46/105 (1st-input bit)
  – **Important:** The software uses the *channel 1* window for it.

- you set up your sequence of XFR-mode channels with:
  – consecutive (uninterrupted) channel numbers
  – window On/Off setpoints
  (A part must be in position throughout the window.)
  – channel mode = transfer mode
  – output mode = stop now (top stop or warning)
- channel switches are actuated in the same order as their channel numbers, ie channel 1 switch first, channel 2 switch second, etc.)

Procedure

1. With the press in motion, transfer a part through the first two stations: [1st-bit & channel 1, or channel 1 with bypassed output & channel 2] Stop the press.

   If the part transfers correctly, the software should not indicate a fault. If it does, check that the window turn On and Off settings are correct.

2. Restart the press and transfer the part to the next station, either stopping at each station or completing the series of stations.

   The software should not indicate a fault.
   If it does, check that the window turn On and Off settings are correct.

3. As appropriate, stop the press and *safely* remove a part.

4. Restart the press and machinery. When the crankshaft position reaches the next window, the software should indicate a fault at the next station because the part is missing. Observe the fault prompt on the Status screen.

5. To resume transfer-mode operation:

   - Press the Resume Operation pushbutton (programmed to B46/106). (This bit resets the logic of the remaining transfer-mode channels according to the status of the errant part: you can remove it or place it back in position to resume operation.)
   - Press the fault reset pushbutton.
   - Restart the press.

   If the software faults when attempting to resume operation, check:

   - wiring of the Resume Operation pushbutton (chapter 5)
   - your ladder logic to move the pushbutton status from the hardware address into the pre-assigned data table address (chapter 8)

Testing a Track-mode DM/PLS Channel

In this procedure, you test the pair of channels (DM and PLS, both with the same channel number) to verify that:

- the DM input turns On (indicating completion of the PLS action) before the track-mode timer times out
- the PLS window is set correctly
  – to allow for completion of PLS action
  – synchronized with other (machine) operations

Before you begin, be sure that:

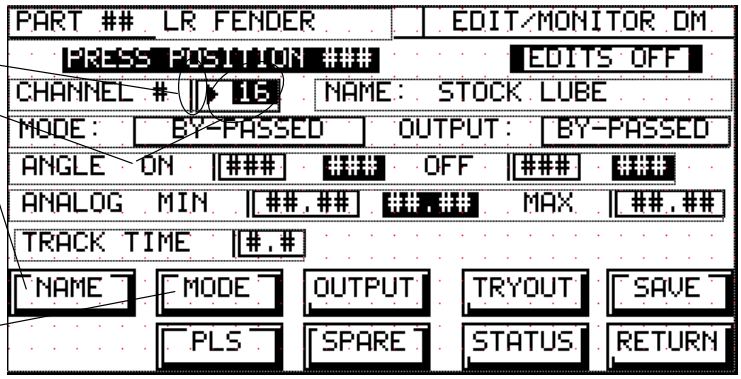
- **Important:** you tested all DM and PLS channels as described above
- DM and PLS channels have the same channel number
- DM and PLS channels are set up correctly

Procedure

1. With a stop watch, time the duration of the intended PLS action. Do this by jogging the press to the PLS turn On position to start PLS action. Record the required time between when the PLS output turns ON and when the DM track-mode input turns On.

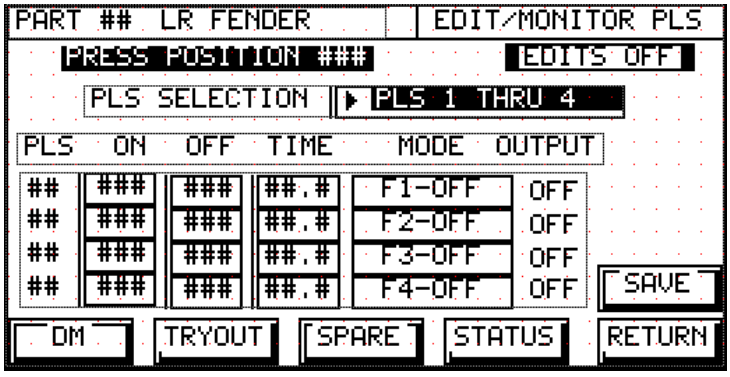
2. Compare the time (step 1) with your Track Time setpoint. The setpoint should be larger than the required time. Adjust the Track Time setpoint accordingly.

To Select or Edit:	Press:
Cursor position |	< > arrow keys
New channel #	∧ ∨ × arrow keys
New channel name	[NAME]
Window On & Off angles	numeric keypad and press ↵
Analog min/max limits	
Track-mode turn Off time	backspace delete errors with ←
Channel Mode & Output *(Processor in Run Mode)*	[MODE] and [OUTPUT]



3. With the press running, observe when the PLS output turns On to start PLS action, synchronized with other machine operations. If necessary, re-adjust the PLS turn On angle accordingly.

To Select/Edit:	Press:
Cursor position |	< > arrow keys
Groups of 4 PLS channels (cursort to PLS SELECT)	∧ ∨ arrow keys
PLS ON angle (cursor to)	numeric keypad and ↵
PLS OFF angle or time	
Data entry error	backspace delete with ←
Another screen	Other keys



4. With the press running, observe when the PLS output turns Off. It must allow sufficient time for PLS action to complete, and turn Off after the track-mode timer times out. If necessary, re-adjust the PLS turn Off angle accordingly.

Data Table Map for PLS, DM, and Counter I/O

We define the area of data table reserved for PLS/DM and Counter inputs and outputs by function and by file address.

Important: We suggest that you program inputs to these addresses in program file PF14 an outputs from these addresses in PF15.

Data Table by Function

We present data table files arranged by DM, PLS, and Counter.

DM		
Digital Inputs	Channels 1-16 Inputs	B46/0-15
	XFR-mode 1st Input	B46/105
	XFR-mode Resume Operation	B46/106
Word Inputs	Analog Input 1	N45:0
	Analog Input 2	N45:1
	: :	: :
	Analog Input 16	N45:15
	Press Speed Constant A	N45:35
	Press Speed Constant B	N45:36
	Press Speed Constant C	N45:37
Digital Outputs	Stop Now	B47/2
	Stop on Top	B47/3
	Warning	B47/4
PLS		
Word Inputs	Press Speed Constant A	N145:2
	Press Speed Constant B	N145:3
	Press Speed Constant C	N145:4
Digital Outputs	PLS Bit Outputs 1-16	B146/0-15
DM and PLS		
Digital Inputs	Enable Edits	B46/100
	Fault Reset	B46/101
	Overwrite Active File	B46/107
Word Storage	Master Password	N46:253
	Press Position	N61:254
	Press Speed	N61:255
Counter		
Digital Inputs	Counter 1 Input	B46/102
	Counter 2 Input	B46/103
Digital Outputs	Counter 1 Output (DN bit)	B47/0
	Counter 2 Output (DN bit)	B47/1

Data Table by File Address

We present data table arranged by ascending file address numbers.

N45	
N45:0	DM Analog Input 1
N45:1	DM Analog Input 2
: :	: :
N45:15	DM Analog Input 16
N45:35	DM Press Speed Constant A
N45:36	DM Press Speed Constant B
N45:37	DM Press Speed Constant C
B46	
B46/0-15	DM Channels 1-16 Inputs
B46/100	Enable Edits (DM and PLS)
B46/101	Fault Reset (DM and PLS)
B46/102	Counter 1 Input
B46/103	Counter 2 Input
B46/105	DM XFR-mode 1st-input
B46/106	DM XFR–mode Resume Operation
B46/107	Overwrite Active File (DM and PLS)
B47	
B47/0	Counter 1 Output (DN bit)
B47/1	Counter 2 Output (DN bit)
B47/2	DM Output – Stop Now (for use with A-B clutch/brake)
B47/3	DM Output – Stop on Top (for use with A-B clutch/brake)
B47/4	DM Output – Warning
N61	
N61:253	Master Password
N61:254	Press Position
N61:255	Press Speed
N145	
N145:2	PLS Press Speed Constant A
N145:3	PLS Press Speed Constant B
N145:4	PLS Press Speed Constant C
B146	
B146/0-15	PLS Bit Outputs 1-16

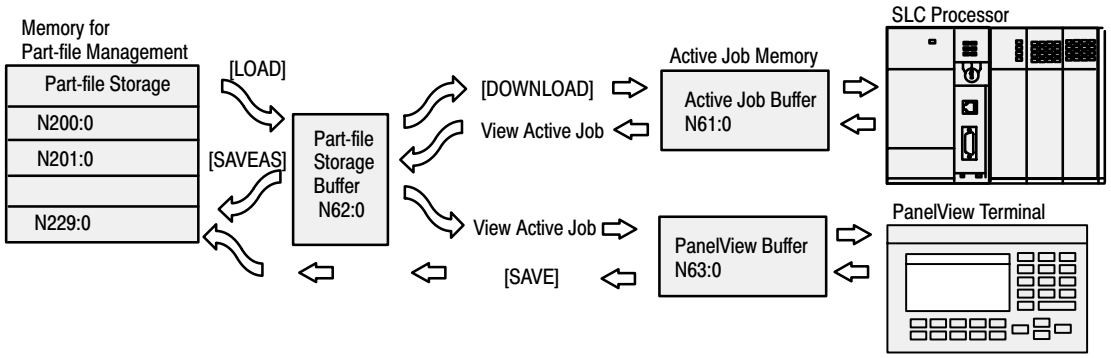
Part-file Management

Storage and Buffer Files

Part-file management of PLS/DM software uses the following data table addresses for storage and buffers files:

Category	File Description	Address:
Part-file Storage	Job 1	N200:0
	Job 2	N201:0
	:	: :
	Job 30	N229:0
Buffers	Active Job on the Machine	N61:0
	Part-file Storage Buffer	N62:0
	PanelView Buffer	N63:0

The PLS/DM software moves part files among the storage and buffer files as follows:



Each part file and buffer uses 250 words of memory.

Part-file Word Descriptions

We present part-file word descriptions as addressed in the Active Job buffer for troubleshooting purposes. The word order remains the same for all buffer and storage files, only the addresses change.

Address:	Parameter:	
N61:0	DM Channel 1	Mode Selection Bits 0-6
1		Angle ON
2		Angle OFF
3		Analog Min Limit
4		Analog Max Limit
5		Output Selection Bits 0-3
6		Channel Name
7		Track Mode Time-out Preset
8		Spare
9		Spare

Address:	Parameter:	
N61:10	DM Channel 2	Mode Selection Bits 0-6
11		Angle ON
12		Angle OFF
13		Analog Min Limit
14		Analog Max Limit
15		Output Selection Bits 0-3
16		Channel Name
17		Track Mode Time-out Preset
18		Spare
19		Spare
N61:20	DM Channel 3	Mode Selection Bits 0-6
21		Angle ON
22		Angle OFF
23		Analog Min Limit
24		Analog Max Limit
25		Output Selection Bits 0-3
26		Channel Name
27		Track Mode Time-out Preset
28		Spare
29		Spare
N61:30	DM Channel 4	Mode Selection Bits 0-6
31		Angle ON
32		Angle OFF
33		Analog Min Limit
34		Analog Max Limit
35		Output Selection Bits 0-3
36		Channel Name
37		Track Mode Time-out Preset
38		Spare
39		Spare
N61:40	DM Channel 5	Mode Selection Bits 0-6
41		Angle ON
42		Angle OFF
43		Analog Min Limit
44		Analog Max Limit
45		Output Selection Bits 0-3
46		Channel Name
47		Track Mode Time-out Preset
48		Spare
49		Spare
N61:50	DM Channel 6	Mode Selection Bits 0-6
51		Angle ON
52		Angle OFF
53		Analog Min Limit
54		Analog Max Limit
55		Output Selection Bits 0-3
56		Channel Name
57		Track Mode Time-out Preset
58		Spare

Address:	Parameter:	
59		Spare
N61:60	DM Channel 7	Mode Selection Bits 0-6
61		Angle ON
62		Angle OFF
63		Analog Min Limit
64		Analog Max Limit
65		Output Selection Bits 0-3
66		Channel Name
67		Track Mode Time-out Preset
68		Spare
69		Spare
N61:70	DM Channel 8	Mode Selection Bits 0-6
71		Angle ON
72		Angle OFF
73		Analog Min Limit
74		Analog Max Limit
75		Output Selection Bits 0-3
76		Channel Name
77		Track Mode Time-out Preset
78		Spare
79		
N61:80	DM Channel 9	Mode Selection Bits 0-6
81		Angle ON
82		Angle OFF
83		Analog Min Limit
84		Analog Max Limit
85		Output Selection Bits 0-3
86		Channel Name
87		Track Mode Time-out Preset
88		Spare
89		Spare
N61:90	DM Channel 10	Mode Selection Bits 0-6
91		Angle ON
92		Angle OFF
93		Analog Min Limit
94		Analog Max Limit
95		Output Selection Bits 0-3
96		Channel Name
97		Track Mode Time-out Preset
98		Spare
99		Spare
N61:100	DM Channel 11	Mode Selection Bits 0-6
101		Angle ON
102		Angle OFF
103		Analog Min Limit
104		Analog Max Limit
105		Output Selection Bits 0-3
106		Channel Name
107		Track Mode Time-out Preset

Address:	Parameter:	
108		Spare
109		Spare
N61:110	DM Channel 12	Mode Selection Bits 0-6
111		Angle ON
112		Angle OFF
113		Analog Min Limit
114		Analog Max Limit
115		Output Selection Bits 0-3
116		Channel Name
117		Track Mode Time-out Preset
118		Spare
119		Spare
N61:120	DM Channel 13	Mode Selection Bits 0-6
121		Angle ON
122		Angle OFF
123		Analog Min Limit
124		Analog Max Limit
125		Output Selection Bits 0-3
126		Channel Name
127		Track Mode Time-out Preset
128		Spare
129		
N61:130	DM Channel 14	Mode Selection Bits 0-6
131		Angle ON
132		Angle OFF
133		Analog Min Limit
134		Analog Max Limit
135		Output Selection Bits 0-3
136		Channel Name
137		Track Mode Time-out Preset
138		Spare
139		Spare
N61:140	DM Channel 15	Mode Selection Bits 0-6
141		Angle ON
142		Angle OFF
143		Analog Min Limit
144		Analog Max Limit
145		Output Selection Bits 0-3
146		Channel Name
147		Track Mode Time-out Preset
148		Spare
149		Spare
N61:150	DM Channel 16	Mode Selection Bits 0-6
151		Angle ON
152		Angle OFF
153		Analog Min Limit
154		Analog Max Limit
155		Output Selection Bits 0-3
156		Channel Name

Address:	Parameter:	
157		Track Mode Time-out Preset
158		Spare
159		Spare
160		Spare
N61:161	PLS Channel 1	ON Angle
162		OFF Angle
163		OFF Time
164		OFF Mode Selection (Angle/Time) Bits 0, 1
165		Spare
N61:166	PLS Channel 2	ON Angle
167		OFF Angle
168		OFF Time
169		OFF Mode Selection (Angle/Time) Bits 0, 1
170		Spare
N61:171	PLS Channel 3	ON Angle
172		OFF Angle
173		OFF Time
174		OFF Mode Selection (Angle/Time) Bits 0, 1
175		Spare
N61:176	PLS Channel 4	ON Angle
177		OFF Angle
178		OFF Time
179		OFF Mode Selection (Angle/Time) Bits 0, 1
180		Spare
N61:181	PLS Channel 5	ON Angle
182		OFF Angle
183		OFF Time
184		OFF Mode Selection (Angle/Time) Bits 0, 1
185		Spare
N61:186	PLS Channel 6	ON Angle
187		OFF Angle
188		OFF Time
189		OFF Mode Selection (Angle/Time) Bits 0, 1
190		Spare
N61:191	PLS Channel 7	ON Angle
192		OFF Angle
193		OFF Time
194		OFF Mode Selection (Angle/Time) Bits 0, 1
195		Spare
N61:196	PLS Channel 8	ON Angle
197		OFF Angle
198		OFF Time
199		OFF Mode Selection (Angle/Time) Bits 0, 1
200		Spare
N61:201	PLS Channel 9	ON Angle
202		OFF Angle
203		OFF Time
204		OFF Mode Selection (Angle/Time) Bits 0, 1
205		Spare

Address:	Parameter:
N61:206	PLS Channel 10 ON Angle
207	OFF Angle
208	OFF Time
209	OFF Mode Selection (Angle/Time) Bits 0, 1
210	Spare
N61:211	PLS Channel 11 ON Angle
212	OFF Angle
213	OFF Time
214	OFF Mode Selection (Angle/Time) Bits 0, 1
215	Spare
N61:216	PLS Channel 12 ON Angle
217	OFF Angle
218	OFF Time
219	OFF Mode Selection (Angle/Time) Bits 0, 1
220	Spare
N61:221	PLS Channel 13 ON Angle
222	OFF Angle
223	OFF Time
224	OFF Mode Selection (Angle/Time) Bits 0, 1
225	Spare
N61:226	PLS Channel 14 ON Angle
227	OFF Angle
228	OFF Time
229	OFF Mode Selection (Angle/Time) Bits 0, 1
230	Spare
N61:231	PLS Channel 15 ON Angle
232	OFF Angle
233	OFF Time
234	OFF Mode Selection (Angle/Time) Bits 0, 1
235	Spare
N61:236	PLS Channel 16 ON Angle
237	OFF Angle
238	OFF Time
239	OFF Mode Selection (Angle/Time) Bits 0, 1
240	Spare
N61:241	Spare Setpoint 1
N61:242	Spare Setpoint 2
N61:243	Spare Setpoint 3
N61:244	Spare Setpoint 4
N61:245	Spare Setpoint 5
N61:246	Spare Setpoint 6
N61:247	Spare Setpoint 7
N61:248	Spare Setpoint 8
N61:249	Spare Setpoint 9
N61:250	Spare Setpoint 10

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